The RUBBER AGE

VOL. 25, No. 9 AUGUST 10, 1929

Late News of the Rubber Industry

Goodyear Earns $12,633,865 In First Six Months of 1929

SETTING a new record for the amount of business for any half year in its history, the Goodyear Tire & Rubber Company shows a net profit for the six months ended June 30, 1929, of $12,633,865 after depreciation, taxes, interest and other charges, equivalent after dividend requirements on $7 preferred stock, to $7.02 a share on 1,398,126 no-par shares of common stock outstanding. In the first half of 1928, net profit was $3,074,200, after depreciation, taxes and interest and after charging to special reserves $2,500,000 cost of crude rubber in excess of market prices.

Net sales for the period totaled $136,747,841 as compared with $125,777,548 for the same period last year, an increase of 8¾ per cent, according to P. W. Litchfield, president of the company. Prices decreased between the periods, and the figures represent an increase in volume of sales which is not completely indicated because of this lower unit price. The volume of business in the first half of 1928, however, was a record for that time.

The consolidated balance sheet as of June 30, 1929, shows total assets of $249,292,126 as against a total of $212,591,395 a year ago. This increase is balanced equally between property, plants and inventories on the one hand and cash and call loans on the other. The total of call loans on June 30 was $21,430,000 as compared with only $1,600,000 on the same date in 1928.

"The consolidated property accounts," says Mr. Litchfield, "were carried June 30, 1929, at $92,826,482, representing an increase of $8,276,827 since December 31, 1928. For several years past the cost of additions to properties has not exceeded the annual amounts of depreciation reserved out of earnings, but in the current year it is expected that capital expenditures will materially exceed depreciation reserves, in view of the program of expansion decided upon to enable the company to keep pace with its rapidly growing business. The increase in capacity is represented by our new tire plant in the South, by substantial additions to existing plants at home and abroad, and by acquisition of additional tire fabric mills.

"Inventories are valued at cost or market, whichever is lower, as is also the rubber and cotton content of finished products. Commitments for crude rubber and raw cotton are at prices below current market levels. It is expected that inventories as at June 30, 1929, which are higher than normal in anticipation of a greater volume of business than during any previous summer period, will return to normal amount by the end of the summer season.

"The current position of the company continues to be favorable, the ratio of current assets to current liabilities being 7 to 1, and there is no indebtedness to banks.

"Common stock increased during the half year 340,927 shares, represented by 320,927 shares offered to stockholders and 20,000 shares subscribed by employes under the employes' stock plan. The 7 per cent preferred stock was called for redemption on May 15, 1929, and dividends on the common stock have been resumed by the declaration of a dividend of $1.25 per share."

The consolidated income account for six months ended June 30, 1929, compares as follows with first half earnings for the previous three years:

	1929	1928	1927	1926
Net sales	$136,747,841	$125,777,548	$118,244,231	$97,835,456
Exp., depr., fed. tax	122,507,263	‡120,172,628	108,228,630	94,393,947
Oper. prof.	$ 14,240,578	$ 5,604,920	$ 10,015,601	$ 3,441,509
Other inc.	1,214,445	577,176	503,853	*3,705,704
Total inc.	$ 15,455,023	$ 6,182,096	$ 10,519,454	$ 7,147,213
Int., disc., etc.	1,841,448	2,288,733	2,714,380	3,132,340
†Other deduct.	979,710	819,163	691,069	.....
Raw mat. res.	.....	.....	750,000	.....
Net inc.	$ 12,633,865	$ 3,074,200	$ 6,364,005	$ 4,014,873
Pfd. divs.	2,820,899	2,796,668	2,826,528	2,826,528
Com. divs.	1,747,636	.....	.....	.....
Surplus	$ 8,065,330	$ 277,532	$ 3,537,477	$ 1,188,345

*Includes net profit of subsidiaries. †Profits of subsidiaries applicable to stocks not held by Goodyear Tire & Rubber Co. ‡In addition to this sum, $2,500,000 excess cost of rubber was charged to reserves previously created therefor.

Fisk Rubber Company Loss Is $236,713 in Six Months

CUTTING its deficit sharply in comparison with the same period of last year, the Fisk Rubber Company has reported for the six months ended June 30, 1929, a net loss of $236,713 after interest, depreciation, amortization, etc. This compares with a net loss of $4,983,134 in the first half of 1928.

The gross sales for the period totaled $30,083,471 as against $30,989,846 in the first half of 1928 and $40,876,877 in the eight months ended June 30, 1927. Unit sales prices have been materially reduced over those of 1928, however, and the sales volume is actually considerably higher. The company has secured several important contracts for original equipment business and is believed to have purchased crude rubber for its requirements several months ahead at prices below 20 cents a pound.

The consolidated balance sheet as of June 30, 1929, shows total assets of $63,414,135 as compared with a total of $61,933,269 a year previous. The greatest increase is in the amount of common stock outstanding, which has been increased from $8,257,525 last year to $16,951,025 this

year, represented by 1,704,392 no-par shares. While the surplus has been reduced from $1,738,782 to $1,193,952, the reserve fund for contingencies has been increased from $363,473 to $1,589,003. The crude rubber commitment reserve of $3,500,000 set up last year was absorbed at that time when the rubber market collapsed. Cash on hand has increased during the year from $2,690,487 to $3,788,743.

The consolidated income account of the Fisk Rubber Company and subsidiaries for the first half of 1929 compares as follows with results of previous years:

	6 mos. end June 30, '29	6 mos. end June 30, '28	8 mos. end June 30, '27	6 mos. end Apr. 30, '26
Gross sales	$30,083,471	$30,989,846	$40,876,877	$28,417,798
Expenses, etc.	28,372,528	†34,189,731	‡37,772,111	‡25,454,885
Operating profit	$1,710,943	*$3,199,885	$3,104,766	$2,962,913
Other income	11,456	30,781	12,812	34,448
Total profit	$1,722,399	*$3,169,104	$3,117,578	$2,997,361
Depreciation	1,095,587	1,059,144	.....	.....
Interest, amort., etc.	863,527	754,886	1,135,271	549,768
Federal tax	.....	.....	265,000	323,000
Net loss	$236,713	$4,983,134	§$1,717,307	§$2,124,593

*Loss.
†Includes write-down of crude rubber inventory and crude rubber in finished goods and work in process to market value at June 30, 1928.
‡Includes depreciation.
§Profit.

Pirelli Factory in England Opened by Prince of Wales

THE new tire and tube factory of Pirelli, Ltd., at Burton-on-Trent, England, was formally opened last month by the Prince of Wales and has started production. The plant is located on a site of 46 acres, is modern in every respect, and will employ about 1,000 workers at the start. It is associated with the Pirelli Company of Italy, largest Italian rubber manufacturer, and is indicative of that firm's world-wide expansion in recent years.

The turnover of the Pirelli General Cable Works, Ltd., at Southampton and Eastleigh, England, a subsidiary of the Italian company already well established, showed an increase in the first six months of 1929 of approximately 30 per cent compared with the corresponding period of last year. Most of the work of the Eastleigh plant has been in the production of high tension cables. This company, which does an annual business of over $5,000,000, is only

Prince of Wales inspecting a tubing machine at the new Pirelli plant

50 per cent owned by the Pirelli Company of Italy, the other half interest being controlled by the General Electric Company, Ltd.

The total sales of the Pirelli Company of Italy, not including any foreign subsidiaries, for the first hal fof 1929 increased about 7 per cent over the first six months of 1928. Sales of automobile tires of the parent company alone are showing a marked expansion, registering a gain of 30 per cent in the period.

The Pirelli group of companies manufactures and sells electric cables and wires, ranking among the largest and most expert producers in this field, as well as tires and miscellaneous rubber goods. In 1928, cables and wires constituted about 40 per cent of the company's business, tires about 40 per cent, and some 380 different rubber articles, including raincoats, rubber heels, floor coverings, belting, pumps, tubes, hospital supplies, etc., the other 20 per cent. The Pirelli Company was formed in 1872 and has been under the control and management of the Pirelli family ever since.

Pirelli's reputation for the efficient manufacture of wires and cables has brought the company many important foreign contracts, its customers including such firms as the New York Edison Company and the Commonwealth Edison Company. The company's tire manufacturing activities are keeping pace with the growth of the automobile in Italy, exclusive contracts having been made to furnish all original equipment for Fiat, Ansaldo and other leading Italian car manufacturers. The company has a factory at Villanueva, Spain, and two plants at Buenos Aires. A third factory is now being constructed in the Argentine capital.

Raybestos-Manhattan, Inc. Formed as Result of Merger

COMMON stock of Raybestos-Manhattan, Inc., made its appearance on the New York Curb Exchange on July 18 as a result of the recent merger of the Manhattan Rubber Manufacturing Company, the Raybestos Company and the United States Asbestos Company. A plan has been evolved for combining the assets and business of these companies, and it was reported last month that over 92½ per cent of all stock has been deposited under the plan. The new common stock has sold between 48⅛ and 53½ since its introduction.

The new company will have outstanding 676,012 shares of common stock as sole capitalization, of which 631,012 shares have been exchanged for stock of the constituent companies and 5,000 shares sold to the bankers to provide proceeds for the retirement of old preferred issues.

The combination brings together units which, at December 31 last, had tangible assets of over $17,000,000. The plant investment was carried at $13,836,000, against which there had been created a reserve for depreciation of $5,532,000. Investments in subsidiaries amounted to $765,000 and current assets of $8,915,000 exceeded current liabilities of $1,240,000 by $7,675,000, standing in a better than 7 to 1 ratio. Asset value of the new stock based on December 31 figures was $26 a share, of which over $12 was in net quick assets.

Earnings for the second quarter of 1929 are estimated at over $1,100,000, or $1.63 a share, and for the six months at over $2,050,000, equivalent to $3.03 a share, or at an annual rate in excess of $6 a share. In virtually all recent years, earnings of the second half have been larger than the first half year. Contrary to popular belief, the company's sales are not correlated to automobile sales, although a considerable portion of its business is in brake linings and clutch facings. Two-thirds of this business, however, is for replacement, on which the margin of profit is very much greater than in sales to automobile factories.

The new company is the largest producer of brake linings and clutch facings in the world. It is well integrated, United States Asbestos having been the lowest cost producer of woven or folded brake lining, while Raybestos has been successful with the recently popular molded brake lining. The Manhattan Rubber Manufacturing Company's

field covers rubberized brake lining, which has also come into favor recently, and also a wide variety of mechanical rubber goods, many of which are for automotive use.

The bankers for Raybestos-Manhattan, Inc., Hayden, Stone & Company, are also bankers for Bendix, one of the largest users of these products in the country. Combined earnings of the three concerns have grown as follows over the past six years:

Year	Combined net income	Equivalent per share
1924	$941,839	$1.39
1925	1,727,463	2.56
1926	1,482,373	2.19
1927	1,877,050	2.78
1928	2,465,586	3.65
1929 (3 months)	948,000	1.40

Chicago Rubber Group Plans To Hold Bi-Monthly Meetings

THE newly organized Chicago Rubber Group of the American Chemical Society is planning to have a meeting about every two months so that papers of sufficient interest can be prepared and so that men from distant points may attend all the sessions. Since the initial organization meeting of the new group, several chemists have signified their intention of joining and it is hoped that membership applications will be received from all the rubber technologists in the western district and from many plant executives whose cooperation is sought.

C. E. FRICK

The new group will meet at the same time as the regular meetings of the Chicago Sections of the American Chemical Society, and the program committee is already arranging to have papers presented and discussed at the first session which will pertain to plant problems. Applications for membership should be addressed to the secretary, Ben W. Lewis, Wishnick-Tumpeer, Inc., 365 East Illinois Street, Chicago, Ill.

Dr. Carl E. Frick of Van Cleef Brothers has been elected chairman of the Chicago Rubber Group, and Otto Urech of the Inland Rubber Company has been chosen to act as vice-chairman. The first meeting of the general organization committee was held on June 28 in the Chemists' Clubroom of the City Club at Chicago.

Rubber chemists in the Chicago district have long felt the need for a group organization, and many of the chemists have been holding round table discussions during the dinner hour of the Chicago Section meetings. After the regular group lecture, the men usually attended some special group meeting which might have a bearing on their work.

Goodyear Will Obtain Site For Factory in Argentina

CONFIRMATION was given by President P. W. Litchfield on July 22 to the reports that the Goodyear Tire & Rubber Company is contemplating the establishment of a tire factory in Argentina. "On account of the fact that two competitors have acquired sites in the Argentine," Mr. Litchfield said, "and due to the difficulty of obtaining suitable sites, Goodyear has decided to obtain a site in that country, looking toward the future. No definite decision has been reached regarding the building of a plant."

At the present time there are no tire or tube factories in South America, although Argentina and Brazil are the two leading export markets for all automotive rubber goods and other Latin American countries are also heavy consumers. It was first reported last March that Goodyear directors were considering a branch factory in the Argentine. Shortly after Michelin had started preparations for the construction of plants in Argentina and Brazil, C. A. Stillman, vice-president of the Goodyear Tire & Rubber Company, left Akron for a tour of South America, returning a few days before President Litchfield officially announced the company's intention to buy a site.

It has long been expected that one of the leading American tire manufacturers would establish a branch plant in South America, Goodyear having considered the project as far back as 1919. Argentina, the best market for foreign-made rubber goods in South America, ranks as the leading rubber manufacturing country in that continent, but none of her factories produce tires or tubes. It is the largest country in the world which is supplied wholly by foreign-made automotive rubber goods.

The value of imports of rubber manufactures into the Argentine for 1928 is estimated at much over $25,000,000. That for 1927 aggregated a value of $24,668,900, of which automobile casings and tubes comprised 80 per cent. In the first six months of 1929, the United States alone exported casings valued at $1,617,562 and tubes valued at $160,638 to Argentina. Other casings and inner tubes exported from this country to the Argentine in the same period were valued at $224,401, solid tires at $110,232, and tire sundries and repair materials at $79,763. During the entire year of 1928, the United States exported rubber goods to Argentina valued at $4,413,900, of which automotive rubber goods comprised $3,187,778 of the total.

There are now four fairly large concerns in Argentina which specialize in the manufacture of rubber goods, and others of smaller size produce rubber articles of one kind or another. In Buenos Aires 8 or 10 important firms produce cut, molded or pressed rubber articles, while about 16 concerns in that city are engaged in the manufacture of waterproof garments. Prominent among the foreign factories are those of the India-Rubber, Gutta Percha & Telegraph Works Company, Ltd., of Great Britain, the Pirelli Company of Milan, Italy, and the Continental Cia., Transatlantic de Caoutchouc, a subsidiary of the German organization. The Pirelli plant at one time manufactured solid tires.

The Goodyear Tire & Rubber Company already has branch factories in Canada, England and Australia.

Rubber Division, A. C. S., to Meet At Atlantic City in September

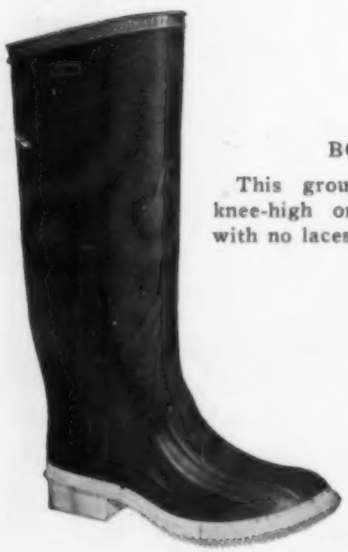
THE Rubber Division of the American Chemical Society will meet at Atlantic City as guests of the New York Rubber Group, on September 26th, 27th, and 28th. The headquarters will be at Chalfonte Haddon Hall hotel. The usual program of papers is being arranged. It is planned to have the scientific program during the mornings, leaving the afternoons and evenings free for informal discussion and recreation. Provision is being made for the entertainment of the ladies.

HEAVY ARCTIC

An example of this class which includes all heavy-weight gaiters for wear over leather shoes.

STYLE GAITER, CLOTH

This model is equipped with an automatic fastener.



BOOT

This group includes all knee-high or higher boots with no laces or fasteners.

Illustrations by courtesy of the United States Rubber Company.

Rubber Footwear Stocks Show High Total

Initial Census Discloses Total of 6,615,171 Pairs of Rubber Footwear

THE initial survey of stocks of waterproof rubber footwear held by dealers has just been completed by the Rubber Division of the Department of Commerce with the cooperation of dealers throughout the United States. Reports received from 26,675 dealers, covering every State in the Union, show their total stocks of rubbers, arctics, gaiters, and rubber boots, as of July 1, 1929, amounted to 6,615,171 pairs.

The stock per dealer averaged 248 pairs, consisting of 22 pairs of rubber boots, 11 pairs of lumbermans and pacs, 22 pairs of heavy arctics and gaiters, 34 pairs of light arctics and gaiters, 29 pairs of style cloth gaiters, 14 pairs of style rubber gaiters, and 116 pairs of rubbers. There is a wide variance in the quantities and classes of footwear held by dealers in the different parts of the country, and as shown under Table I below, not every dealer stocks all these classes of footwear.

As with the periodical surveys of dealers stocks of radio equipment and automobile tires made by the Department of Commerce in recent years, this survey was made to provide basic information contributing to trade stability. The market for rubber footwear is highly seasonal and confined mostly to the winter months; demand varies with winter weather conditions, and the market is complicated by frequent changes in design and color of ladies' gaiters to correspond with more exacting style demands. Consequently, there is always uncertainty in market conditions

TOTAL REPORTED STOCKS, SHOWING AVERAGE STOCKS PER DEALER

	Dealers Reporting		*Stocks on Hand*		*Average Stock*
Type of Footwear	*Number*	*Per cent of Total*	*Pairs*	*Per cent of Total*	*Pairs*
Rubber boots	19,828	74.3	588,102	8.9	29.3
Lumbermans and pacs..	10,017	37.6	294,304	4.4	29.3
Heavy arctics and gaiters	15,839	59.4	579,047	8.8	36.6
Light arctics and gaiters	15,350	57.5	910,485	13.8	59.3
Style gaiters, cloth	12,378	46.4	770,460	11.6	62.2
Style gaiters, rubber	8,353	31.3	378,684	5.7	45.3
Light and heavy rubbers	20,704	77.6	3,094,089	46.8	149.5
Total	26,675	100.0	6,615,171	100.0	248.0

PERCENTAGE OF DEALERS REPORTING EACH CLASS OF FOOTWEAR, BY REGIONS

			Arctics and Gaiters		*Style Gaiters*			
Regions	*Rubber Boots Per cent*	*Lumbermans and Pacs, Per cent*	*Heavy Per cent*	*Light Per cent*	*Cloth Per cent*	*Rubber Per cent*	*Rubbers Per cent*	*Total Dealers Per cent*
New England..	73.7	60.2	63.1	72.4	57.5	30.1	87.2	100.0
Mid. Atlantic..	74.9	55.8	70.9	71.6	51.6	34.1	84.8	100.0
E. No. Central	80.5	49.2	75.8	70.9	59.6	40.1	85.2	100.0
W. No. Central	72.0	30.5	79.3	75.2	58.1	38.3	82.1	100.0
South Atlantic	63.2	25.2	39.0	37.0	31.2	22.2	78.4	100.0
E. So. Central	73.6	17.2	38.1	35.3	27.7	24.0	59.9	100.0
W. So. Central	86.0	6.7	25.2	28.3	15.0	16.0	46.4	100.0
Mountain	66.9	39.9	62.3	53.7	42.8	29.3	67.2	100.0
Pacific	72.4	30.7	19.5	19.6	32.3	24.0	75.2	100.0
Total U. S.	74.2	37.4	59.5	57.6	46.6	31.2	77.7	100.0

Dealers' Stocks on First Survey

19,675 Retailers Have on Hand Arctics, Gaiters, and Boots

often leading to scarcity or surplus of supplies, either of which is an economic loss divided between manufacturers, dealers, and consumers.

There is a carry-over of stocks both by dealers and manufacturers at the end of every season. The present and subsequent annual surveys will determine the extent of the normal dealer carry-over, and enable manufacturers and dealers to judge how business, during the coming season, may be affected by the carry-over, both for individual States and the country as a whole. It is believed the dealer carry-over this year is higher than usual, but a definite idea as to the normal carry-over can be secured only through several surveys.

The number of dealers reporting stocks of each class of rubber footwear, the number of pairs reported, and the average pairs per dealer, as of July 1, 1929, for the United States as a whole, is shown in the first table below.

It may be observed that of all dealers reporting stocks, only 31.3 per cent had stocks of style rubber gaiters and 37.6 per cent lumbermans and pacs, while 77.6 per cent were holding stocks of rubbers and 74.3 per cent rubber boots. The following definitions were used in classifying stocks:

Boots: All so-called knee-high or higher boots with no laces or other types of fasteners.

Lumbermans and Pacs: All farming pacs and bootees; hunting pacs or bootees; mining pacs or bootees; lum-

LARGE STOCKS OF RUBBERS, BY STATES

(Including only dealers with over 1,000 pairs in stock)

	Number of Dealers	*Pairs of Rubbers*
California and Oregon	6	53,355
Connecticut	5	28,201
Colorado and Utah	3	19,362
Illinois	3	21,726
Indiana and Minnesota	4	6,487
Iowa and Kansas	3	7,888
Kentucky, Virginia and West Virginia	5	12,004
Maryland and District of Columbia	5	10,089
Maine	8	16,033
Massachusetts	26	85,924
Michigan	3	41,455
New Hampshire	6	9,324
New Jersey	9	11,024
New York	42	127,072
Ohio	10	86,008
Pennsylvania	23	56,235
Rhode Island	3	5,400
Wisconsin	7	11,673
Unallocated	6	17,827
Total	177	627,087

NUMBER OF MAKES OF FOOTWEAR HANDLED

Number of Makes	*Number of Dealers*	*Per cent of Total*
One make	7,354	37.9
Two makes	7,680	39.5
Three makes	2,981	15.3
Four makes	894	4.6
Five makes	324	1.7
Six makes	193	1.0
Total	19,426	100.0

LUMBERMANS AND PACS

This red gray sole Walrus is typical of the class of farming, mining, hunting and lumberman footwear.

STYLE GAITER, RUBBER

A new rubber gaiter in tan and brown, with snap fastener, typical of this group of women's, misses' and children's footwear.

LIGHT RUBBER

Heavy rubbers and all styles which might be termed gum shoes are included in this class.

LIGHT ARCTIC

High automatic fastener gaiters are included in this group, as well as all lightweight buckle gaiters and arctics, such as this model.

berman over wool boots, lumberman overs for leather tops.

Heavy Arctics and Gaiters: All heavy-weight cloth or heavy all rubber arctics or gaiters made with any type of fastener for wear over leather shoes.

Light Arctics and Gaiters: All light-weight buckle gaiters and arctics; all high automatic fastener gaiters.

Style Gaiters (women's, misses' and children's):

Cloth—All cloth snap fastener and low automatic fastener gaiters regardless of colors.

Rubber—All snap fastener and automatic fastener rubber gaiters.

Light and Heavy Rubbers: All styles which might be termed Gum Shoes or ordinary Rubbers.

A rough indication of the varying market demand for rubber footwear in different parts of the country is given by showing the percentage of dealers reporting stocks of each class of footwear for each region. For example, taking the total number of reporting dealers in New England as 100 per cent, it appears that 60.2 per cent of these dealers handle lumbermans and pacs, and 87.2 per cent handle rubbers, the highest percentage of dealers with stocks of these items in any region. The West South Central States, while furnishing a poor market for rubber footwear in general, have a higher percentage of dealers stocking rubber boots than any other area. The dealer demand for rubber boots appears to vary less throughout the country than for any other item. Arctics and gaiters of all kinds seem to be most generally stocked in the North Central States.

Shows Popularity of Various Types

Similar percentage studies for any State may be made by a dealer on the basis of the complete statistics. For example, by making a table of the percentage which stocks of each type of footwear bears to the total stocks reported for his State, and comparing it with a similar table based on his own stocks, the dealer can determine whether or not his stocks are distributed by types of those of other dealers in the State. The statistics also give an indication of the popularity of different types of rubber footwear in each State, and thus should help every dealer to judge whether or not it is desirable to add new types to lines already carried.

A special tabulation of rubbers held by dealers with over 1,000 pairs in stock show 177 dealers holding 627,087 pairs of rubbers, of which 312,355 pairs were held by 13 distributors located one each in California, Connecticut, Illinois, Michigan, Pennsylvania, and Utah, two each in Massachusetts, and New York, and three in Ohio. The following statistics, by States so far as possible without disclosures, make it possible to determine how much these large stocks influenced the "average stocks per dealer" figure for various regions. For the United States as a whole, the average stock of rubbers per dealer would be 121.7 pairs if these large dealers were not included in the average.

Dealers were asked to state the number of different makes of rubber footwear which they handle. Only 19,426 of the 26,675 dealers reporting stocks answered this question. An analysis of these replies show that fewer dealers limit stocks to one make than handle two makes. Only about 7 per cent of the dealers handle over three different makes. It would appear that dealers might obtain better results by concentration of effort on one line of merchandise, and at the same time reduce inventory, carrying charges, and general overhead expenses. Unless the separate makes are in different items (as, for example, one make of rubber boots, another of rubbers, and another of style gaiters) there would appear little necessity for such diversification of makes handled.

The number of names on the mailing list used for this survey was 131,500. In addition to the reports of stocks from 26,675 dealers, 1,775 questionnaires were returned marked undeliverable by postal authorities, 4,516 firms reported that they do not handle waterproof rubber footwear, 1,337 questionnaires were returned with notice that the firms to which they were addressed are now out of business, and 1,034 forms were received from dealers reporting stocks entirely sold out and from firms reporting no stocks on hand without specifying whether rubber footwear was handled, making the total number of responses 35,337. Statisticians may be able to use these data in estimating the total number of active footwear dealers in the United States.

BOOK REVIEWS

UEHLING BAROMETER AND VACUUM RECORDER. Published by the Uehling Instrument Company, 473 Getty Avenue, Paterson, N. J. 1929. 6 pp.

One of the most important factors in the economy of steam consumption for power purposes is the absolute back pressure. The existence of an unnecessarily high back pressure represents a preventable waste in turbine steam consumption that is astonishing. The instruments described in this bulletin show the absolute back pressure at a glance and enable the turbine operator to maintain the highest vacuum possible for a given barometer reading.

THE RMA MANUAL OF TIRE REPAIRING. Published by the Rubber Manufacturers Association, Inc., 250 West 57th Street, New York City. 1929. 64 pp.

Tire manufacturers some years ago realized the advisability of co-operating to give the tire repairman the benefit of their combined experience and research work. In this, the third edition of this handbook published in as many years, several improvements developed by the various companies have been incorporated. The manual is being distributed to repairmen throughout the country by the Tire Accessories and Repair Materials Committee of the Association.

MOISTURE IN CARBON BLACK. By C. R. Johnson. Published by Godfrey L. Cabot, Inc., 940 Old South Building, Boston, Mass. 1929. 12 pp.

The occurrence of moisture in carbon black has been the source of frequent query and often misunderstanding. The reasons for this and the remedy for the user are described in this pamphlet, which is a reprint of an article published in THE RUBBER AGE on February 25, 1928.

THE INTERNATIONAL FINANCIAL POSITION OF THE UNITED STATES. Publishel by the National Industrial Conference Board, Inc., 247 Park Avenue, New York City. 1929. 296 pp.

Since the World War the United States has been transformed from a debtor to an international creditor position, and attention has become more and more focused upon our country's financial status with relation to the rest of the world. In one volume, this study gives a complete account of America's international financial relations and of the underlying financial and credit structure of the country.

THE AMERICAN MERCHANT MARINE PROBLEM. Published by the National Industrial Conference Board, Inc., 247 Park Avenue, New York City. 1929. 182 pp.

It is generally agreed that the competitive status of American vessels in world trade is unfavorable and that, in the absence of governmental protection and aid, relatively few private American shipowners would survive. The purpose of this book is to bring together and to clarify the facts and controversial issues of the merchant marine problem and thereby to promote a clearer public understanding of the situation.

26TH ANNUAL REPORT OF THE BUREAU OF SCIENCE, PHILIPPINE ISLANDS. Published by the Bureau of Printing, P. I. 1929. 81 pp.

A survey of the diseases of Hevea rubber in Mindanao and Basilan, mentioned in this report to the Department of Agriculture and Natural Resources of the Philippines, indicates that the plantations, although harboring several of the major diseases, are in general in a thrifty condition as the result of close inspection and early eradication of minor outbreaks.

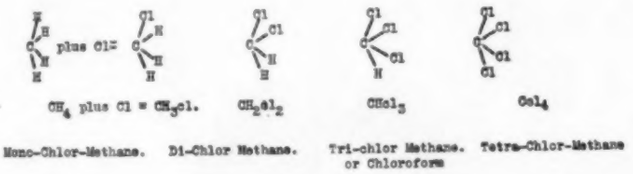
Toxic Substances *in the* Rubber Industry

PART II

By P. A. DAVIS, A.B., M.A., M.D.
Assistant Medical Director, Goodyear Tire & Rubber Company

CARBON TETRA-CHLORIDE

CARBON TETRA-CHLORIDE CCl_4 is a saturated halogen derivative of marsh gas or methane. It does not belong to the benzylic series, but to the lower unsaturated hydro-carbon series. The parent substance is methane and by substitution of chlorine for hydrogen, various products are formed.



The toxicity of chemical substances in many cases is not inherent in the pure substance, but to absorbed products formed in its manufacture. For example, carbon tetra-chloride may be made commercially in many different ways.

1. Chlorination of carbon disulphide. This method produces many impurities in the finished product, chiefly sulphur compounds which are toxic.
2. Chlorination of ethylene.
3. Catalytic action of the electric arc on carbon and calcium chloride.

Redistillation gives a very pure substance in process 2 and 3, but further chemical treatment is necessary where there are volatile sulphur compounds present.

The most dangerous impurities of commercial carbon tetra-chloride are phosgene, hydrogen sulphide, free hydrochloric acid, organic sulphides and carbon sulphide. Redistillation removes many of these. In some instances the toxicity of chemical compounds can be predicted. The early discussion of carbon tetra-chloride has been prompted from the experience gained by using it as a diluent for benzol.

Experience has shown that a certain combination of benzol and carbon tetra-chloride is almost non-explosive when subjected to static sparks of electricity. This is quite a safety factor in the prevention of fires. However, by decreasing the fire hazard, the poisonous hazard is increased and this becomes more serious the greater the percentage of carbon tetra-chloride used. The gaseous form of carbon tetra-chloride is heavier than air and will form pockets and diffuse to lower levels similar to benzol. However, when it is heated it rises apparently much faster than benzol. I have examined many workers that have been subjected to various concentrations of carbon tetra-chloride and the most pronounced physical symptoms are as follows:

1. Slight headache.
2. Nausea. In many cases this becomes severe and lasts for several days.
3. Nervousness.
4. Mental confusion.
5. Loss of weight; dry dermatitis.
6. Secondary anemia; slight jaundice.
7. Chronic spasms of muscles; necrosis of liver.
8. Acidosis; phosphaturia and irritative nephritis.
9. Loss of consciousness.
10. Coma and death.

There have been several cases reported where carbon tetra-chloride produces fatty degeneration of the liver, kidneys and heart with a subsequent necrosis. The action of carbon tetra-chloride is very similar to that of chloroform except that it is more intense and this is due to the larger amount of HCl liberated as it is broken down in the body.

CCl_4 plus H plus O plus body influences 4HCl plus oxidation products of carbon, CO and CO_2 and intermediate oxidation products, the most poisonous of which is $COCl_2$—carbon-chloride or phosgene.

Alcohol seems to act as a catalytic agent for CCl_4 and intensifies its action. A person under the influence of alcohol when exposed to CCl_4 becomes disoriented and often times maniacal.

Modes of Absorption

1. Inhalation of fumes of carbon tetra-chloride.
2. Alimentary system absorption. Carbon tetra-chloride is sometimes given as a medicament for hookworms in small doses and in a short time followed by a purge which prevents much absorption.
3. Absorption by the skin and its appendages. Dr. Alice Hamilton reports a case where a woman collapsed and died while having her hair shampooed with carbon tetra-chloride. How much absorption takes place by the hair is not determined, but I believe that the greatest absorption in this case was due to inhalation as the heavy fumes gravitated about her nose and mouth.

Carbon tetra-chloride extracts the fats from the skin and produces a dry condition which favors absorption and also starts a dry dermatitis with a cracked condition of the hands. Often times this produces avenues for secondary pus infections. This condition can be corrected if the workmen will use cocoa-butter, vaseline or a good grade of cold cream (non-vanishing) on the skin after having used carbon tetra-chloride.

As with most volatile substances the principal avenue of absorption is the respiratory system.

The occasional inhalation of small amounts of carbon tetra-chloride produces very little effect unless the concentration is very high, and the lower the concentration the less the immediate effects produced. Dilutions of 0.01% show very little effect over a period of 6 to 8 hours, but if this continues daily without intermediate aeriation, then accumulative effects are shown and chronic CCl_4 poisoning occurs. Concentrations of 0.1% to 0.5% produce very little effect if only a short exposure is made, and is not repeated until the next day.

The nausea and vomiting produced is a central nervous system reaction and not a local gastric one. I recall one case that was very amusing. A man was working on a traveling crane in a low ceiling building where a mixture of carbon tetra-chloride and benzol was being used over heated mandrils. There was enough heat generated to make the CCl_4 very volatile and he was getting the effect of it, producing nausea and vomiting, but he did not realize that it was due to the fumes of CCl_4. When he went on his crane in the morning he took a bucket to be used as a receptacle for his vomiting.

He later reported to me and his condition was found to be due to the CCl_4 and not to indigestion, as he thought. This condition was remedied at once by proper ventilation and reduction of the CCl_4 used.

If the concentration of the CCl_4 is kept at a minimum and the circulation of air at a maximum very few effects are noticed. A concentration of 0.01% and below can be tolerated for long periods of time. However, I do not advocate a continued exposure to carbon tetra-chloride of low concentrations for it is the slow absorption that produces the chronic stage of the poisoning and the retrograde changes in the liver, kidneys and the hemotogenic organs.

Preventive Measures

1. Proper exhaust ventilation. Carbon tetra-chloride is heavier than air and heavier than benzol, therefore floor ventilation is necessary. It forms pockets where there are no air currents. Cross natural ventilation is also necessary.
2. Processes using carbon tetra-chloride should be carried out in closed containers or under hoods with suction ventilation.
3. Selected workers should be put on operations using carbon tetra-chloride. The following types should not work in very high concentrations of the solvent:
   - A. Very obese persons.
   - B. Undernourished persons.
   - C. Any one with pulmonary diseases.
   - D. Those with gastric ulcers or who have a tendency to vomiting.
   - E. Persons with hypertrophic or atrophic liver condition.
   - F. Those with nephritis or diabetes.
   - G. Glandular disturbances, especially thymus and thyroid enlargements.
   - H. Any blood disturbances or myocardial degeneration.
4. Substitution products should be used in place of carbon tetra-chloride in all processes where possible.
5. Rotation of workers so that one individual has a chance to completely aeriate and eliminate the products of CCl_4 decomposition while the other is working on the job.
6. Frequent examinations.
7. Periodical inspection of the processes and determination of the CCl_4 concentrations used.

Frequent examinations are very valuable as an indication for the removal from the vapor of carbon tetra-chloride. Whenever an examination shows any of the following conditions present the individual is removed from this particular work and is placed where he is in the open air as much as possible.

1. Persistent nausea after having worked in very low concentrations for several eight-hour shifts.
2. Loss of appetite and loss of weight.
3. Reduction of hemoglobin 15%.
4. Hyperacidity of gastric contents.
5. Hyperacid urine.
6. Persistent dizziness after eight hours rest and aeriation.
7. Decreased blood pressure.
8. A marked poikilocytosis and anisocytosis.

The condition that usually follows nausea and loss of appetite is acidosis and this is manifested very readily in those who perspire freely and an irritative dermatitus develops in the body folds which becomes very annoying.

While carbon tetra-chloride is a very desirable solvent and a diluent for benzol to prevent fire, it is at the same time a very toxic substance even in its purest state. The redeeming feature of the toxicity is the fact that it produces symptoms by very slight absorption and removal can be made before any serious conditions develop.

Treatment

1. Removal from contact with the substance.
2. Aeriation—fresh air, oxygenated if necessary.
3. Alkalinization with $NaHCO_3$ or $CaCO_3$.
4. Feed levulose, glucose and animal fats.
5. Tr. Digitalis to protect the heart.
6. Hexaresorcinal for kidney irritation.
7. Intravenous normal saline and glucose solution, or Fischers solution.
8. Transfusion if necessary, followed by iron compounds.
9. Adrenalin should not be used in cases of carbon tetra-chloride poisoning where there is a possibility of any myocardial involvment.
10. If any bronchial conditions develop, which is common after the use of some impure grades of CCl_4, due to the free chlorine and carbonyl chloride, they should be treated, first by inhalations of Tr. benzoin compound and pine needle oil, and later followed by some soothing syrup containing codeine unless the condition of the kidneys and liver contraindicate it.
11. Free catharsis.
12. Force liquids and starchy foods.

Conclusion

Carbon tetra-chloride is an industrial hazard when the vapor is permitted to escape into the open room and its concentration is constantly above 0.01%.

The hazard can be removed by proper ventilation and using the substance in closed systems.

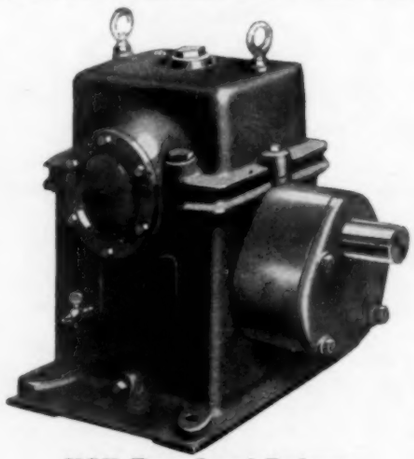
Frequent examination of the workers will enable one to rotate them or remove them from contact with the fumes and prevent any serious condition developing.

Research workers will no doubt provide a non-toxic substitute for carbon tetra-chloride or will produce a diluent for benzol or gasolene which will eliminate the hazard.

Supervised selection of individuals to work with this substance will greatly eliminate the hazard.

New Worm Reducer

FOOTE Bros. Gear & Machine Company, Chicago, Ill., has recently developed a new addition to their "Hygrade" line of anti-friction worm gear speed reducers, known as the HGX type. The type HGX is an intermediate step between the HGS single reduction unit and the HGD double reduction unit. The HGS single reduction unit with right angle drive has a maximum ratio of 58 to 1, at which the maximum efficiency can be obtained.



HGX Type Speed Reducer

The HGD double reduction provides for all ratios over 58 to 1 and up to 5,000 to 1 but the shafts are parallel. The new type HGX, a step between the HGS and the HGD which provides higher reduction ratios than standard ratios listed for the type HGS.

Like all the other type "Hygrade" reducers, the type HGX is a fully enclosed self-lubricating unit, having anti-friction bearings, bronze worm gear and nickel steel carbonized, hardened, ground and polished worm.

The rate of rubber consumption in foreign countries has increased even more remarkably than in the United States during the first four months of 1928, as shown by the following figures released by the Department of Commerce:

	1928	1929
	(Long Tons)	
January	11,444	29,557
February	19,682	24,739
March	22,730	28,646
April	17,140	26,497
Total	70,996	109,439

No. 1 of a Series of Articles on the

Uses of RUBBER in Modern Aircraft

Rubber in Airplane Construction

By JOHN F. HARDECKER

Chief Draftsman, U. S. Navy Aircraft Factory, Phila., Pa.

EDITOR'S NOTE: *The rapid strides made in aviation during the last two years threatens to duplicate the remarkable advance in the automotive industry which took place in the second decade of this century. The new developments in aeronautical engineering are calling for an increasing amount of rubber tires and accessories and new uses for rubber are springing up over night. It has been considered particularly timely, therefore, to review the latest applications of rubber in modern aircraft construction. The following will be the first of a series of four articles on this subject by an authority in the aircraft industry.*

THE year 1928 marked the close of the first quarter century of the history of modern aviation. The first flight in a heavier-than-air machine by the Wright Brothers at Kitty Hawk, N. C., just twenty-five years previous, marked America's pioneering contribution to aeronautical achievement. Today, we find the United States still leading the world in aviation progress, as the following figures for commercial flight mileage for 1928, taken from a British source, clearly show:

Great Britain	950,000 miles
France	4,500,000 miles
Germany	6,750,000 miles
United States	10,472,000 miles

The year 1929 is destined to be the banner year for American aviation. Financing for America's newest industry, aviation, reached astonishing proportions during the first four months of 1929, according to A. O. Hunsaker, president of Aircraft Finance Corporation, who places the figures for the third of this year at $143,480,125 for about 20 companies. In fact, aviation in America has already exceeded the proportions of a $300,000,000 industry and airplane transportation has within two years become a positive factor in industry and commerce.

To this very considerable progress, the rubber industry has been a major contributor. When we make a casual inspection of the exterior of an airplane, we get an extremely limited conception of the significance of rubber in aircraft use. Just as the most essential element in the automobile—the engine—is hidden beneath the hood, so, too, most of the rubber, equally important, is concealed from cursory inspection. Nevertheless, it is there, performing day in and day out, some of the most salient functions in aircraft.

From the very beginning, and all through the earlier phases, when the volume of rubber business obtainable from the aircraft industry certainly did not bulk large enough to warrant the interest from a financial viewpoint, the rubber industry has shown itself ever willing to cooperate in the development of specialized rubber products to meet the exacting demands of the aviation industry. The extensive research and development facilities of the rubber industry have been always whole heartedly available for the use of the aircraft industry. As a consequence, as the aeronautical industry finds itself on the threshold of real quantity production, it also finds the rubber industry fully equipped to meet its increased demands, and ever ready to pioneer into new fields of application of rubber in aeronautical activity.

Rubber Not Affected by Air Conditions

Rubber accessories and parts are not affected by high altitudes nor sea level conditions and if the plane meets with a mishap they are the least ruptured. This cannot be said of any other part on a plane. Most parts can be duplicated by some other material, while the rubber products generally cannot. Just as rubber predominates in many lines of industry today, so the rubber parts on airplanes are becoming of increasing importance due to their efficiency.

In presenting the story of the utilization of rubber in

aircraft, the most difficult task lies in attempting to arrange the applications in a logical sequence or classification. Unlike most materials whose uses naturally fall into one or another of a few major groupings, rubber possesses so many different desirable properties and forms, both by itself and in combination with so many varied materials, that it is used in so many different and oft times unusual ways in aircraft as to almost escape classification.

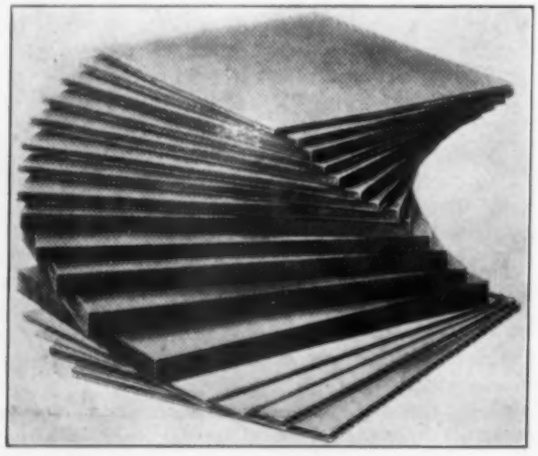
In this first article of a series, attention will be stressed on a few major uses which might be roughly classed as structural, followed by some particular applications of a general nature. Rubber lumber is still in the development state, but its possibilities for structural use are indeed very promising. The use of sheet rubber in the pressing of metals for airplane structures is a real boon to the aircraft industry. In anticipating the day when metal aircraft will be produced much in the same manner as the automobile is today, the aircraft industry was confronted with the problem of designing its structures so that quantity production of pressings might be initiated when the time was ripe without the expense incidental to tooling up with complete matched metal dies on experimental development work. The use of sheet rubber in lieu of a second matched die proved to be the answer.

Rubber cement is one of the accepted means of structural fabrication, particularly in lighter-than-air activities, such as dirigibles, balloons, etc. Rubber tubing, airplane matting, pontoon handhole covers and grip handles are all current practice for their particular function in aircraft.

Rubber Lumber

Rubber lumber, generally known as aeroboard, is still in the experimental state. Like wood, it has a cellular structure, affording rigidity and strength with minimum weight, and can be worked with ordinary wood working tools. The strength weight ratio makes this material extremely valuable in airplane design. Experiments have been made with aeroboard faced with hard rubber, fabric, duralumin, wire screen and wood; and all conceivable combinations are being rigidly tested to determine the most suitable construction for airplane design. Ultimately, it is planned to be used for wing covering, wing ribs, fuselage construction, flooring, pontoons and quite possibly, wheels. When it is completely developed, the all-rubber airplane may well become a reality.

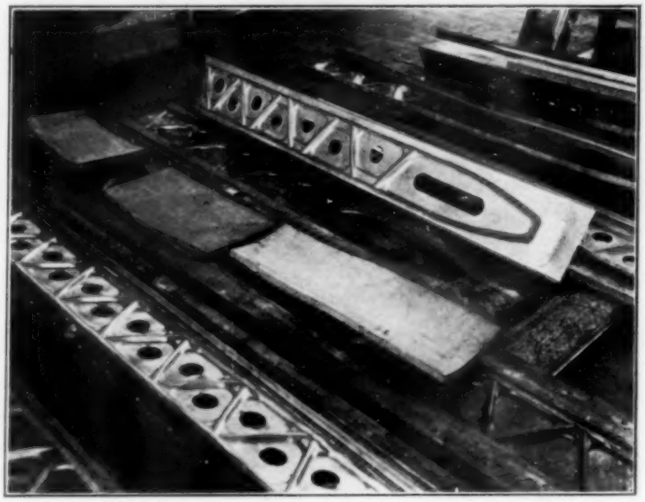
This material has been used in the manufacture of pontoons and airplane fuselages. One type consists of two



Aeroboard (B. F. Goodrich Rubber Co.)

sheets of hard rubber, between which lies a layer of porous, but non-resilient composition, all three parts being vulcanized into one sheet. Due to the softening characteristics of rubber when heated, this material can be molded to different shapes when heated to the temperature of boiling water and retains such shape when it is cooled without destruction of any of the original tensile strength of the board. It can be attached to frames with nails or screws without danger of splitting.

Another form of rubber lumber uses regular airplane cloth on the outside surfaces. The rubber is made up with varying percentages of blow. For example, in a 100% blow, the material is calendered at one-half the final thickness desired. This is then put into a press and confined by mold strips around the edges, and the action of the heat on the blowing agent incorporated in the rubber causes the rubber to become filled with small molecules of gas. This actually causes the rubber to swell or blow. It gives a construction of minute cells simliar to that which exists in wood except that each cell is an individual small body completely isolated from the adjoining cells so that no direct path exists through the sheet.



Showing Sheet Rubber, Single Metal Die and Formed Duralumin Sheet Beam Pressing

Still another type is a sheet rubber product which consists essentially of a core or center of cellular hard rubber, reinforced on the two outside surfaces with a specialized rubber fabric. This fabric is a 10-ounce cotton duck, frictioned on two sides with a flexible hard rubber compound. This is used for decking, bulkheads and gussets of airplane floats or pontoons. A skin coat of .005 inch of flexible hard rubber compound is added to the above material when used for bottom planking. These sheets have a minimum tensile strength for the ⅛ inch thickness of 2,700 lbs. per sq. in., for the 3/16 inch thickness of 1,700 lbs. per sq. in., and for the ¼ inch thickness of 1,100 lbs. per sq. in.

As this material is still in the experimental stage, the above quoted variations of this rubber lumber represent but a stage in its development program, and by no means represent the ultimate possibilities, but are given only as an indication. Just what the final product adopted for general use will be, is difficult to say, but that rubber lumber, regardless of the final form, has strong possibilities for general use in airplane construction, is a very conservative way of summarizing the situation.

Rubber has a natural flexibility, and the retention of much of this quality in rubber lumber, will prove of great benefit in fuselage construction. The stresses set up in a fuselage when landing are more likely to be absorbed, and their destructive strains checked or eliminated when the body is of this rubber lumber.

Sheet Rubber in Die Pressing of Metal Parts

In making pressed metal parts for airplanes, the use

in a press of a single die with sheet rubber in lieu of a second matched die, has been a decided factor in making possible experimental development of pressings. The rubber provides a low cost method of making these pressings, and as a result permits the development of designs which are ideally suited for ultimate production with matched metal dies.

The method presents the following advantages. A single die only is needed. This die may be of wood, metal or other material, depending upon the amount of use it is to have. The die may be made in the most reasonable of a variety of ways, depending upon which is most applicable to the work in hand, it may be built up, it may be cast or it may be machined from stock. The die need be finished only to the tolerances and with a smoothness required in the completed part, i.e., no fitting of male and female dies is required.

For this purpose the rubber used should have a uniform thickness of 1½ inches with a smooth finish and a specific gravity of less than 1.0. The rubber should be Hevea or Plantation Rubber, free from reworked rubber, mineral rubber, rubber substitutes, lampblack or more than small amounts of mineral matter, hydrocarbon waxes, or oils and shall not be highly vulcanized.

The chemical analysis of the rubber should be as follows:

Acetone soluble saponifiable matter (Max.)	3.00%
Acetone soluble unsaponifiable matter (Max.)	3.00%
Mineral matter (Max.)	2.00%
Total sulphur (Max.)	7.00%
Gum (Min.)	90.00%

The flexibility and softness of the rubber should be measured with a Widney Modulimeter. The area of the pressure foot will be taken as 0.1219 square inches. The loads should be as shown in the table, with a time limit of loading and unloading of 30 seconds.

Increasing Load

Load	*Deformation (Max.) Inches*
500 grams	0.010
1000 "	.020
1500 "	.035
2000 "	.050
2500 "	.065
3000 "	.080
3500 "	.095
4000 "	.110
4500 "	.125
5000 "	.145

Decreasing Load

3500 grams	0.145
3000 "	.135
2500 "	.120
2000 "	.100
1500 "	.085
1000 "	.060
500 "	.040
0 "	.015

Rubber Cement

There are several types of rubber cement used for various purposes in aircraft use. There are cements for general utility purposes, cements for gas cell and envelope seams on dirigibles and balloons, and cements for attaching rubber to metal which are stronger than the rubber itself. Certain very sticky cements are used for attaching matting to metal or wood, metal to metal, or wood to wood. This latter is often used in place of marine glue in wooden pontoon construction and for sealing seams and making repairs in metal pontoons.

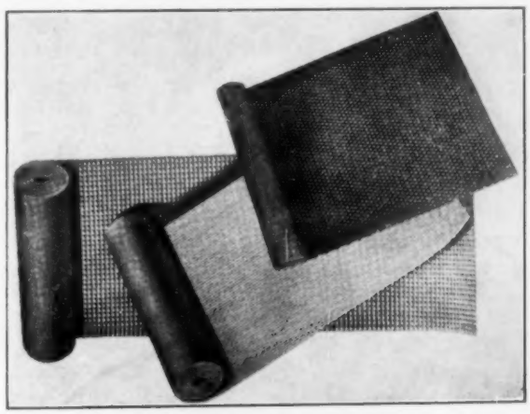
A novel use of rubber cement is in the manufacture of nose bumpers on floats. These are usually of leather on the outside, and are stuffed with ground cork sealed into a solid block by rubber cement, using the leather cover as a mold.

Rubber Tubing

All rubber tubing of various diameters and wall thicknesses finds a great number of uses on modern aircraft. To merely enumerate a few there is the tubing used for remote control indicators on the dash, for air speed meter connections and in connecting the leads on voice tube intercommunicating sets, used for talking purposes in open cockpit planes. In airship work it is used in manometer and purity tube leads.

Airplane Matting

Airplane matting is used for the wing walk and as a floor covering in cabin type planes. While ordinary pyramid

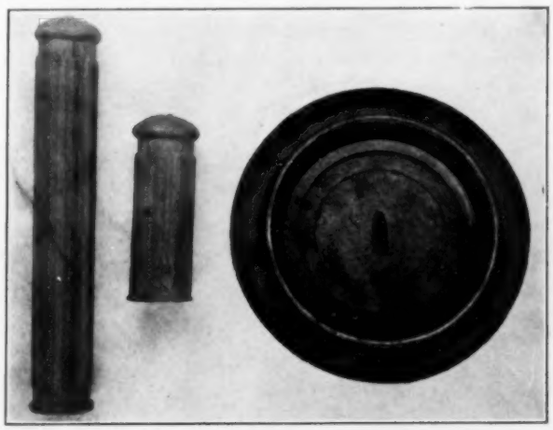


Airplane Matting (U. S. Rubber Co.)

rubber matting in various thicknesses has sometimes been used, the aircraft industry prefers a special airplane matting which is made with a miniature pyramid design, unusually light and with a single ply of fabric on the back. It is usually furnished in sheets, and weighs about .2 pound per square foot. It may be cemented to either duralumin or wood. Metal mouldings are used for fastening down the edges.

Pontoon Hand Hole Covers

These covers are used to close the hand holes of compartments in seaplane floats. These hand holes are used for drainage access and for inspection purposes. With the use of these hand hole covers, openings in pontoons are



Control Handle Grips (Duval Rubber Co.) and Pontoon Hand-Hole Covers (B. F. Goodrich Co.)

made absolutely watertight. They cannot be pushed in or knocked out by the force of water, and yet they are easily removed for inspection of float interiors. No bolts or screws are necessary.

Hand hole covers are molded out of soft rubber and are reinforced with a fabric filler ring. Each cover, including fabric ring, weighs three-tenths of a pound. For assembling

with wooden floats, or metal floats having wooden braces, metal flanges must be used. In metal pontoons the openings may be properly flanged to meet the covers, obviating the use of special flanges.

Rubber Grip Handles

The rubber grip handles for the joy stick are very similar to motorcycle handles, and are used on all stick control planes. There are several sizes used to fit 7/8, 1, and 1 1/8 inch control stick tubing, and certain types have provisions for control buttons in the end. Large planes use control wheels similar to automobiles, which are often made of hard or vulcanized rubber.

A Combined Flow-Meter and Indicator

AN interesting modification of the regular U-tube manometer, now being placed on the market by the Meriam Company of Cleveland, Ohio, permits the instrument to be used as either flow meter or as a pressure indicator. The illustration shows the new instrument as applied to a differential control system for gas and steam pressure, as used in a gas-heated steam heater, but it is obvious that there are many other type of equipment to which it can be applied.

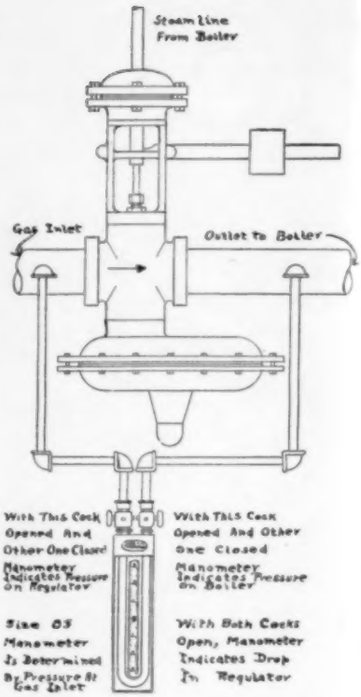
The operation of the instrument depends upon the fact that all manometers operate upon the differential principle, whether rate of flow or actual pressure is indicated.

When a manometer is used to read pressure of liquids or gases, one of the arms is connected to the atmosphere and the other to the source of pressure to be measured. The difference produced in the liquid levels in the two arms shows the difference between the pressure measured and that of the atmosphere.

Each inch of difference in level indicates .036 lbs. per square inch pressure if the liquid used is water, or .491 lbs. per square inch if mercury is used. Other liquids give results proportional to their specific gravity.

When a manometer is used to indicate flow of liquids or gases, the two U-arms are connected one on each side of an alloy steel disc connected in the pipe line whose flow is to be measured. The steel disc has an orifice of known size, and this produces a definite drop of pressure for a given rate of flow. This drop is shown on the manometer, which is calibrated to read rate of flow.

Hitherto, it has been necessary to use two manometers when both pressure and flow readings are required, but the new instrument avoids this difficulty by a simple extra device.


Steam Line From Boiler
Gas Inlet
Outlet to Boiler
With This Cock Opened And Other One Closed
Manometer Indicates Pressure On Regulator
With This Cock Opened And Other One Closed
Manometer Indicates Pressure On Boiler
Size Of Manometer Is Determined By Pressure At Gas Inlet
With Both Cocks Open, Manometer Indicates Drop In Regulator

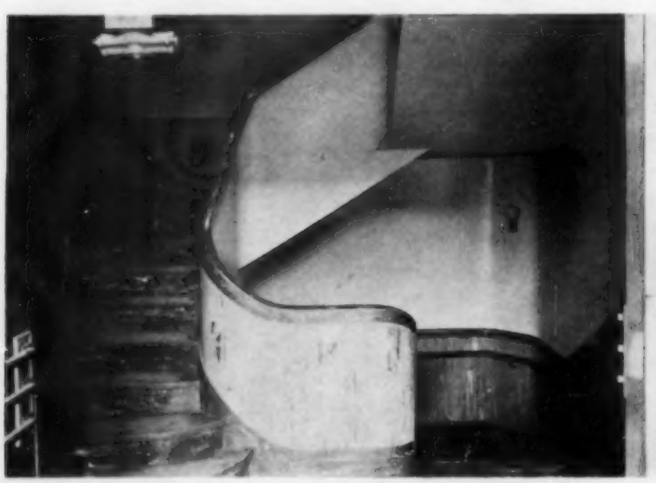
In the accompanying diagram, it will be seen that with the left-hand cock open and the right-hand one closed, the manometer is between the gas line and the open air, and therefore reads gas pressure. With the reverse arrangement of the cocks closed, the manometer is connected to show pressure across the regulator—or, if a double scale and the measuring disc be also provided, the rate of steam flow.

"Disperso"

THE introduction on the market of a new carbon black under the above brand name of "Disperso" has been recently announced by Wishnick-Tumpeer, Inc., New York City, N. Y. The new product is produced under a special process which uses the George Wheatley press to expel occluded air, leaving the carbon black free from fluff. Its manufacturers state that it adds potential strength and increases the ageing properties of rubber, in addition to making milling easier.

New and Attractive Applications of Rubber Tilings

A FEATURE of the eleventh annual exhibition of contemporary American design at the Metropolitan Museum of Art recently was the attractive display of rubber tilings in a model bath and dressing room set designed in modernistic style. Another unusual application of rubber tilings is shown below in the vertical coverings of rubber tiling on the balustrades of a western banking company.



Stairways and Wainscotting in the Cache Valley Banking Company, Logan, Utah, Showing Unusual Application of Rubber Tiling

Bath and Dressing Room by Ely Jacques Kahn in the Metropolitan Museum Exhibition of Contemporary American Design

Photos by Courtesy of U. S. Rubber Co.

Some Uses of Aluminum *in the* Rubber Industry

Properties of Aluminum Make It Especially Practical and Economical in the Manufacturing Processes of Rubber Goods—Is Not Attacked By Sulphur—High Heat Conductively Aids in Vulcanization

By G. N. UNGER

Aluminum Company of America, Cleveland, Ohio

UNCURED rubber very readily picks up foreign particles of all descriptions. This necessitates the keeping of all storage bins and equipment scrupulously clean. The material to be used in connection with rubber equipment should, therefore, be one to which rubber has the least tendency to adhere, and one which can be easily cleaned and polished. At the same time the material should be of such a nature that it will resist the attack of any of the chemicals involved in rubber manufacture. Metal molds or mandrels, used in the vulcanizing of rubber, should also have good heat conductivity.

Aluminum fulfills all of these requirements. Rubber does not adhere readily to aluminum, and it is easy to clean and polish the aluminum parts of a mold or inner tube mandrel after the rubber has been stripped off. Because of the ease with which rubber may be removed, only infrequent cleanings of the aluminum parts are necessary.

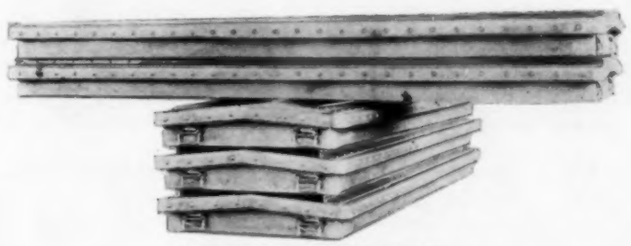
Special Advantages of Aluminum

The fact that aluminum is not attacked by sulphur nor by most of the compounds of sulphur is of prime importance. The metal can be used in contact with most of the organic acids and with some of the mineral acids as well. It is not corroded by naphtha, talc, or moisture.

The high heat conductivity of aluminum permits better heat transference in the vulcanizer than is obtainable in steel.

Aluminum has a low specific gravity, and this property of the metal makes it particularly adaptable for movable equipment. Iron and steel are from 2.6 to 2.9 times as heavy, while the weights of brass and bronze, copper, and nickel, are from 3.1 to 3.3 times as heavy as an equal volume of aluminum. This saving in weight naturally reduces the fatigue of the operator, and makes for increased production.

Within the past few years strong aluminum alloys have been developed, which retain the salient characteristics of aluminum and have mechanical properties comparable to those of mild steel. These alloys can be machined as readily as brass and bronze and about three times as fast as iron or steel. The inception of aluminum alloys with such a remarkable combination of properties, both in wrought and cast states, has greatly increased the uses for aluminum in the rubber industry.



Aluminum Curing Tanks

Aluminum Tubing and Tire Cores

For some time strong aluminum alloy tubing has been satisfactorily used for both straight and circular inner tube mandrels. Besides having a high heat conductivity, being light, and easily cleaned, aluminum mandrels impart a glossy finish to the inner tubes.

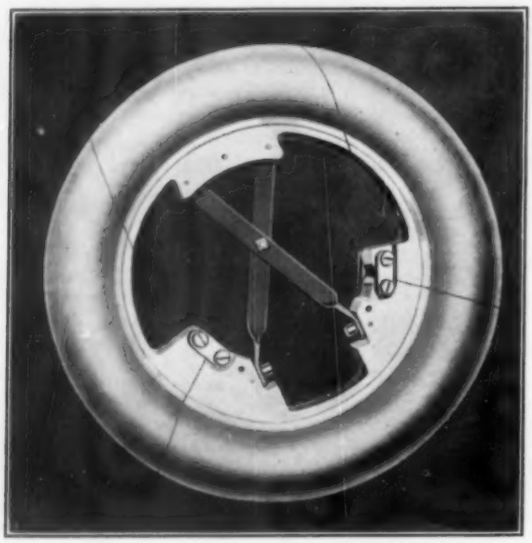
The method of manufacturing in many rubber companies requires the frequent handling of the tire building cores. Even in the smaller sizes these cores are quite heavy. The introduction of balloon tires magnified this condition until sand cast cores of aluminum alloys were used. Die cast inserts, carrying tread designs, are in some instances being placed in forged steel tire molds to avoid the excessive cost of engraving mold blanks.

Aluminum molds are usually made from forged slabs, rolled plates, or castings. Such molds may be easily machined, and can be handled with a minimum of fatigue. Among the rubber

A FEW OF THE MORE COMMON USES OF ALUMINUM IN RUBBER FACTORIES

- Circular and Straight Tube Mandrels
- Tire and Tube Molds
- Molds for Hard Rubber Products, Battery Boxes, etc.
- Lasts for Rubber Footwear
- Molds for Dipped Goods
- Molds for Toys, Drug Sundries, Flooring and Various Other Rubber Products
- Tire Building Cores
- Coiled Sheets for Stamping Rubber Goods
- Tanks, Trays and Pans in Compounding and in Drying Ovens
- Conduits Throughout Plants to Prevent Corrosive Action
- Aluminum Paint for Equipment, Walls, etc.
- Sheet Aluminum for Rubber Workers' Tables
- Linings of Bins, Stock Racks and Shelves
- Embossed Labels for Wrapped or Molded Goods

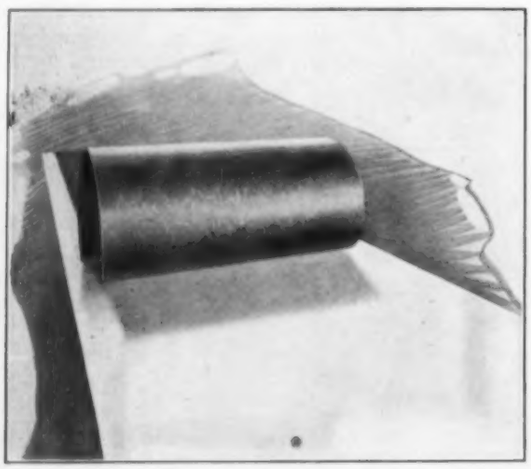
articles, which are now being successfully made in aluminum alloys molds, may be mentioned rubber balls, bulbs, toys, automobile mats, garden hose, water bottles, motorcycle pedal pads, floor matting, and a variety of blown goods, mechanical goods, and druggists' sundries.



Sand-Cast Sectional Core of Heat-Treated Aluminum Alloy

For producing the serial numbers and brands on tires, hose, matting, and other articles, aluminum coiled sheet is widely used. The sheet when stamped takes a clear impression of the die, and imparts this to the rubber without sticking. It stamps more easily than tinned steel sheet, and is not so likely to cut the hands of the workmen handling the stamped numbers.

On account of its resistance to corrosion, aluminum is particularly adaptable in the hard rubber field. Large quantities of sulphur and its compounds are present and the fumes from the heating and curing tanks are destructive to most metals. Aluminum tanks, trays, and pans, have



Rubber Flooring and Strong Aluminum Alloy Sheet on Which It Has Been Cured

replaced those of steel or iron because they last many times as long.

The hard rubber storage battery has developed another use for aluminum. In many instances, the entire mold and core is made of aluminum alloy forgings; while in others, aluminum sheets, permanent mold castings, or die castings, are used. Some ferrous metal molds and cores are lined with aluminum alloy plates.

For small, hard rubber articles such as fountain pens, etc., aluminum rod and tubing are used for mandrels because they do not corrode and are light.

Aluminum conduit is extensively used in the curing rooms and boiling rooms of rubber manufacturing plants, and in other places where there is a large amount of sulphur present in the atmosphere. It is highly resistant to corrosion, and once installed will last for years.

With a suitable varnish vehicle, aluminum bronze powder makes a durable and bright aluminum paint of high lighting efficiency, and one which will not discolor in contact with the sulphur-containing gases. With certain paints there is a tendency for the pigment to be eaten away by the corrosive action of such gases. The life of the paint is, attacked by sulphur or sulphur fumes, aluminum paint will therefore, materially shortened. Since aluminum is not preserve the surface upon which it is placed for a much longer period of time. Not only does aluminum paint serve as a protective coating against chemical attack but also as an insulation against heat losses on high temperature equipment. It can be used with satisfaction and economy on vulcanizers and other heating equipment within the rubber factory.

Evaluating Rubber Shares

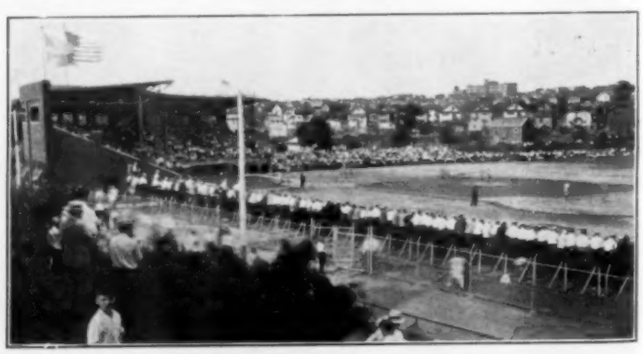
IN a discussion as to the future of rubber and rubber shares the *Evening Standard* of London is responsible for the statement that a novel method of arriving at values has been roughly achieved. In part, it says:

"In view of the tendency to reduce costs to 6d per lb. and the hope that the material will rise to 1s per lb., a ready method of reckoning is used in some quarters. The idea is to take the number of pounds produced per £1 of capital. If the former is divided by four, the result will give a rough estimate of the valuation of the shares, based on 1s rubber, 6d costs, and on a 10 per cent earnings yield."

Sungei Buloh, for instance, has a capital of £50,000 and a crop estimate of 1,000,000 lbs., that is 20 lbs. per £1. Divide 20 by 4, leaves 5, which compares with a present market price of 3⅞. The estimate is rough, but it gives some idea when comparing values of rubber shares.

The New Goodyear Stadium

The Goodyear Tire & Rubber Co., on July 14, dedicated to the use of its employees at Akron, Ohio, Seiberling Field, one of the most elaborate and practical athletic stadiums ever provided by any industrial organization. The stadium was erected at a cost of $60,000 and will seat 1,400 persons. Adjoining bleachers bring the total seating capacity of the stadium to more than 4,000.



Seiberling Field, Akron, O.

RUBBER CHEMISTRY and Technology

The Double Refraction of Stretched Rubber*

By W. C. Van Geel and J. G. Eymers

Physical Institute of the University of Utrecht, Holland

Summary

A relation between the double refraction and the elastic tension of rubber is derived. The formula which is given defines double refraction as a function of tension up to a certain limiting value of the tension, at which point a strict proportionality between double refraction and tension begins. At this limiting tension the elongation is 70 per cent., and it is noteworthy that at just this elongation X-ray photographs of rubber begin to show fibre diagrams.

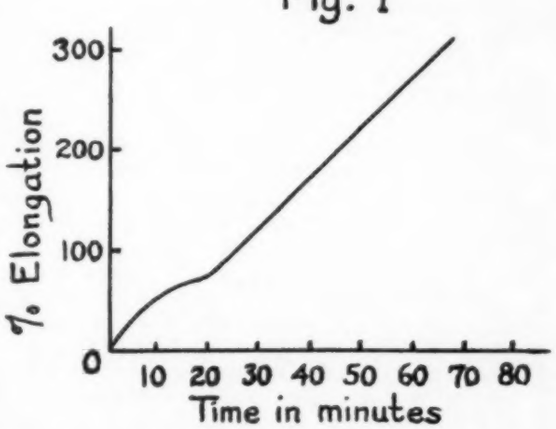
THE double refraction of stretched rubber has already been measured by Bjerkèn[1] and by Rossi[2], who found no general law which would show the way in which double refraction depends upon the tension.

It seemed therefore that it might be of value to obtain precise measurements again, particularly since it has now become technically possible to prepare rubber which absorbs only a little light, so that it is no longer necessary to work with very thin sheets.

The measurements were begun with raw plastic rubber, which was milled into thin sheets. Subsequently rubber obtained by the evaporation of pure latex was tested.

First of all it is necessary to distinguish between plastic and

Fig. 1



elastic rubber. By plastic rubber is meant a rubber which when subjected to stress, in the manner described below, shows no ultimate deformation but whose elongation is a function of the time, the effect being a "flow." By elastic rubber is meant a rubber which under a given stress shows after a brief time a definite deformation. When the tension is released, elastic rubber resumes in a short time its original condition, whereas plastic rubber remains in its deformed state and only after a long time, often after days, returns to its original state.

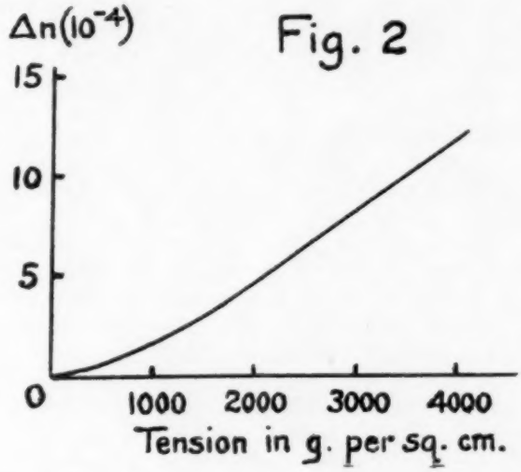
Plastic Rubber

In the case of plastic rubber the elastic properties were first of all investigated. A small rectangle was drawn with ink on the sample. The latter was then suspended in a rack and loaded with definite weights by means of a scale pan.

The changes in length and width of the rectangle and in the thickness of the samples at definite loads were measured. It was found that the length, width and thickness changed with time when the pan was loaded with a constant weight. No equilibrium was reached, and the rubber continued to stretch until it broke. Only at very small loads was an equilibrium reached. Fig. 1 shows the change in length with time. At the beginning when the rubber is still elastic, the increase in length and the decrease in thickness and width are linear functions of the time.

The double refraction was measured by means of a Babinet

Fig. 2



compensator. The source of light was a mercury vapor lamp, from which the green light was removed by a filter.

Fig. 2 shows the double refraction as a function of the load per square centimeter (tension). Except at the beginning at low tensions when the rubber is still elastic, the double refraction is a linear function of the tension. Plastic rubber shows therefore a certain resemblance to a liquid for, as is known, certain liquids under tension show a double refraction which is proportional to the tension. Since these phenomena are not of direct interest in the present problem, further measurements were made with elastic rubber.

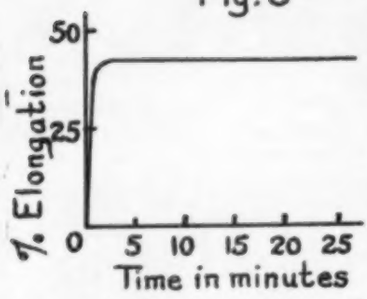
Elastic Rubber

Very elastic rubber was obtained by drying latex. Under stress, the length, width, thickness and double refraction changed only during the first moments. Equilibrium was reached in a short time, which depended upon the stress, but which never exceeded three minutes even with high loads.

Fig. 3 shows the change in the length with the time. With elastic rubber, the measurements could be made under well defined conditions, and measurements of the double refraction as a function of the tension had some significance. A new sample sheet of rubber was used for every measurement, for after a strip had once been stressed, it showed on being stressed again a greater double refrac-

Translated from Zeitschrift für Physikalische Chemie, Vol. 3, No. 3, pages 240-246, May 1929.

Fig. 3



tion than did a fresh sample under the same tension.

Fig. 4 shows the results of these measurements. The mathematical sign of the double refraction is positive. The curves in Fig. 4 are for strips of different thicknesses. The magnitude of the double refraction per unit of thickness obviously depends upon the original thickness, because of the presence of an oxidized layer on the surface of the rubber. As a result, the effective thickness is measured disproportionately high.

The curves may be altered by proportional changes in their ordinal values to allow for the inaccurate measurments of thickness, but this does not change their form, and the double refraction is known only within a certain precision.

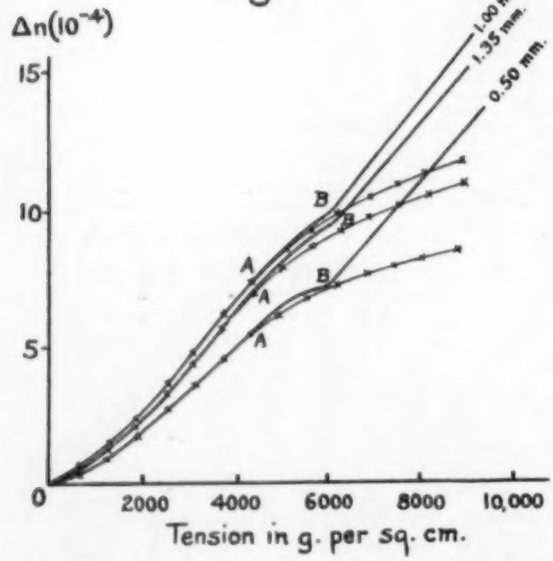
The form of the curves is the essential feature, and it is significant that their form is very similar to that of curves showing the relation between the double refraction and field strength of liquid crystals in a magnetic field. This relation has been derived by Ornstein[3] and is represented by the equation:

$$\Delta\Sigma = A\left(1 - \frac{3}{b}\coth + \frac{3}{b^2}\right)$$

where $\Delta\Sigma$ is the change in the double refraction $b = \frac{\mu H}{kT}$, where in turn μ is the magnetic moment of a particle of the liquid-crystalline substance, H is the magnetic field, K is the Boltzmann constant, T is the absolute temperature, and A is a constant.

Ornstein developed this formula on the basis that liquid crystals are composed of anisotropic molecules which in the magnetic field become aligned in parallel formation. This alignment of anisotropic

Fig. 4



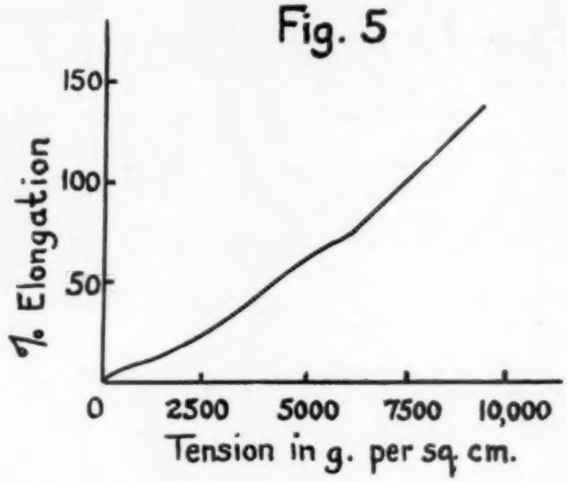
molecules probably takes place in rubber when the latter is stretched. In this case b in the formula above can be assigned a value proportional to the tension (at constant temperature). In Fig. 4 a theoretical curve for each thickness is recorded[4].

It is evident that the form of the theoretical curves conforms to that of the experimental curves up to a certain limit (B in the Fig.). At B the linear relation between double refraction and tension begins, as with plastic rubber. The deviation of the curves in the range from A to B probably depends upon the fact that the new condition which is fully evident at B is previously effective to a small extent.

With every sample the linear relation began at the same tension (approximately 6 kg. per sq. cm.), regardless of the original thickness of the samples. From this point on, the length, width, thickness and double refraction again varied with the time, just as with plastic rubber.

The elongation in centimeters as a function of the tension was measured at the same time, the results of which are shown in Fig. 5. The form of the curve is somewhat similar to that of the curves in Fig. 4. Here, too, a linear relation begins at a tension of 6 kg. per sq. cm., in this case between elongation and tension. At this point the elongation of every sample was approximately 70 per cent.

Fig. 5



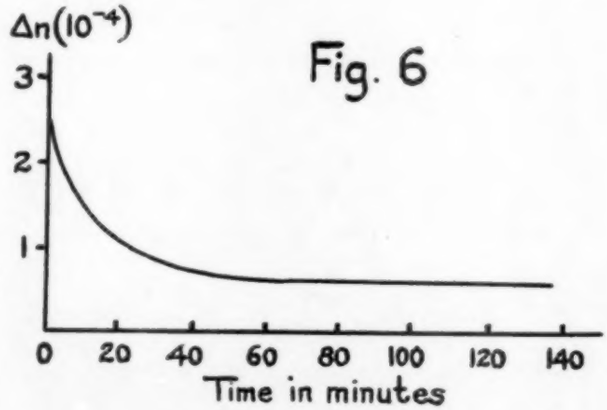
With plastic rubber, the linear relation also began at 70% elongation, but here the tension was very small.

This limiting value of 70% elongation appears therefore to be a *characteristic constant of pure rubber.* It probably depends upon the composition of the rubber and upon the temperature.

It is worthy to note that in X-ray photographs of rubber at elongations below 70 per cent., Katz[5] found only an amorphous ring, while above this elongation (*i. e.*, in the range where a linear relation was found in the present work on double refraction) crystal interferences appeared, the intensity of which increased with the elongation.

Another remarkable property of plastic rubber should be noted. When a strip of rubber is stretched beyond its limiting point of flow and is then held at constant length, the double refraction diminishes with time. It does not disappear however, and a residual double refraction remains present. This is also true of the tension. The remarkable fact is that this residual double refraction and residual tension are almost or wholly independent of the original elongation.

Fig. 6



The diminution in the double refraction with time is shown in Fig. 6.

It is hoped that the work described above offers an exact experimental demonstration of the relation between the double refraction and elongation of pure rubber. Investigations of the evolution of heat during the elongation of rubber will be described in a forthcoming paper.

Acknowledgment is made to L. S. Ornstein for his help and

interest, to A. van Rossem for supplying the rubber, and to J. R. Katz for making the work possible and for his valuable advice.

Notes

1. *Ann. Physik* **43,** 808 (1891).
2. *Rend. Napoli* [3] **16,** 125, 142 (1910).
   Cimento [5] **20,** 226, 268 (1910); [6] **2,** 151 (1911).
   Beibl. Physik **35,** 206, 364; **36,** 67.
   Fortschritte Physik **2,** 394 (1910).
3. *Ann. Physik* **74,** 445 (1924).
4. This form of the double refraction curve is also found for stretched celluloid. See Ambron-Frey, *Polarisationsmikroskop,* 175.
5. *Naturwissenschaften* **1925,** 110.

The Tire Trade of Japan

THE Japanese import statistics are very unsatisfactory as an index of the number of automobile tires imported into Japan, according to a recent Department of Commerce report. The total weight of imports of automobile casings, solid tires, inner tubes, and motorcycle casings and tubes is included under one figure. Total imports in 1928 amounted to 3,879,592 kin, or 5,148,219 pounds.

The Japanese import statistics of tires are gross since they include weight of inner packing, such as burlap and the like. Considering the average rate of a casing as 20 pounds—diving the above weight, that is, 4,060,219, on this basis gives us imports of 203,010 automobile casings. This total must be considered as only approximately correct, but it checks very closely with known factors. For example, the United States trade returns show 115,598 auto casings exported to Japan in 1928. Shipments to Japan from Canadian factories of American companies totaled about 65,000, which brings the American total to approximately 180,000. It is reasonable to assume that imports from Europe account for most of the remainder. The Department of Commerce has evolved the following estimate of imports into Japan:

Recapitulation of Imports

	Numbers
Automobile casings	203,010
Solid tires	10,000
Automobile inner tubes	200,000
Motorcycle casings	12,000
Motorcycle tubes	12,000

Tires are produced locally by the Dunlop Rubber Company, a subsidiary of the British concern. Certain quantities are exported to nearby consuming areas which were estimated to be 206,000 units during 1928. There is also a very large export of bicycle tires to China and other Far Eastern markets.

No information is available in regard to the annual production capacity of the local Dunlop Company. It is possible, the Department of Commerce believes, to work out an approximation of their total annual output from known factors. It is known that total consumption in 1928 amounted to approximately 330,402 casings. It is also known that original equipment sales were 83,307 casings and that these sales were almost exclusively Dunlop tires. Imports during the year amounted to 203,010 and that, if they are deducted from the total replacement sales of 247,095, Dunlop's share of the replacement business would be approximately 44,085. This figure added, to original equipment sales, gives a total for the local Dunlop factory of 127,482 casings. It is believed that this is approximately correct and at any rate is the best figure it is possible to secure.

Dunlop has a practical monopoly of the original equipment business, since it is in a position to quote prices which the representatives of American tire manufacturers are unable to meet.

Schaphorst's CHATS *with the* ENGINEER

By W. F. SCHAPHORST, M.E.

Elimination of Static From Belts

HERE is some interesting and valuable advice on the elimination of static electricity from rubber and leather power transmission belts as given by P. W. Edwards and J. O. Reed of the Bureau of Chemistry and Soils of the U. S. Department of Agriculture.

Stated briefly, these scientists find that the best way in which to eliminate belt static is to apply a material to the surface of the belt which will serve as a good conductor of electricity. Such a method is perfectly logical, of course. There is nothing new about the theory, or the method, but the question has always been: "What is the best material to use?"

We all know that rapidly moving metal parts such as metal discs never cause static troubles. Why? Because the discs themselves are excellent conductors of electricity. Metal band saws which run at velocities of thousands of feet per minute never give static troubles because metal saws conduct electricity. Good sense therefore tells us that if any belt can be converted into a perfect conductor of electricity there will be no static whatever. Practice proves the theory to be correct.

At the same time, of course, any material applied to a belt for the removal of static must not decrease the coefficient of friction between the belt and the pulleys; it must not injure the belt in any way; and it must wear well.

Edwards and Reed experimented with a number of materials for use on rubber belts. They found that "a good grade of spar varnish was a satisfactory vehicle. Powdered aluminum, bronze, copper, graphite, and lamp black, were tried as the conducting mediums. Various proportions of each of these materials were mixed with spar varnish.

The most satisfactory results for a non-static rubber belt dressing was obtained by using 18% lamp black with 82 parts of good spar varnish. For a good non-flammable thinner they recommend equal volumes of carbon tetrachloride and varnish makers and painters naphtha. This was carefully tested on belts in actual installations on an air compressor and on a rubber conveyor belt. It was also tried on rubber belts in flour mills and on threshing machines. When applied to the entire surface and allowed to dry, static did not develop.

The above material is all right for rubber belts, but it is not satisfactory for leather belts. For leather belting they recommend the following formula:

> "100 cc. liquid fish glue, 88 cc. glycerine, 100 cc. suphonated castor oil, 170 cc. water, 82 grams lamp black, and 20 cc. of 2 per cent ammonium hydroxide."

They state that in some instances it might be well to increase the quantity of glycerine and fish glue.

The material for leather belting may be applied while the belt is moving and in use, but the dressing for the rubber belting must be allowed to dry before the belt can be used.

NATIONAL

Para-Nitrosodimethylaniline
Triphenylguanidine
Thiocarbanilide
Aniline Oil

The uniformity, purity, and strength of these accelerators meet the exacting demands of the rubber trade.

Test samples for their adaptability to your purpose.

Intermediates Division

National Aniline & Chemical Co., Inc.
40 Rector Street New York, N. Y.

NATIONAL N QUALITY

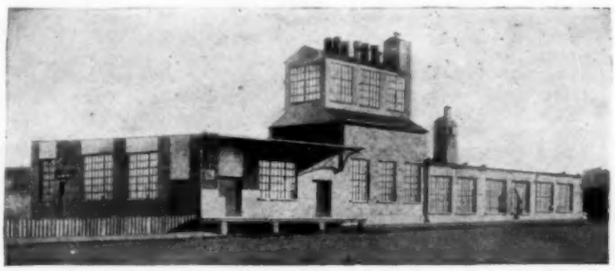
PIONEER

GOOD SULPHUR, QUICKLY DELIVERED

WHEN Pioneer is ordered you get a quality Sulphur—quickly. Our producing plant is located in St. Louis, assuring prompt attention to your requirements.

Pioneer Sulphur is made by the St. Louis Sulphur & Chemical Co. The resources of this company, and its reliability, are widely and favorably known.

Your Sulphur needs are satisfactorily taken care of when Pioneer is specified.



There is more power to your Sulphur Dollars when you buy "PIONEER" BRAND

ST. LOUIS SULPHUR & CHEMICAL COMPANY
Primm & Vulcan Sts., St. Louis, Missouri

WISHNICK-TUMPEER, Inc.,
Sole Selling Agents

NEW YORK, 251 Front Street
CHICAGO CLEVELAND

EDITORIAL COMMENT

Stability in Labor Costs

ONE of the most signficant economic changes in American industry during the past decade has been the changed relationship between the course of general business conditions and that of wage earnings, according to the National Industrial Conference Board.

The wage situation has been hailed both as a cause and a result of continued industrial prosperity in the United States, but its most significant phase, in the view of the Conference Board, is to be found in the remarkable stability of wage rates as reflected in the average earnings per hour, which for some time have shown an increasing tendency to resist the influence of ordinary fluctuations in business activity. Whereas in former years a slowing up of activity almost invariably made itself felt in declining wage rates, and increased business activity was likely to result in rising rates of pay, average hourly earnings per worker in the manufacturing industries during the past five years have been practically unchanged. Hourly earnings per worker in 25 major branches of manufacturing during 1924-28 from month to month on the average have varied by only two cents between the highest and lowest points, and by one cent during the 12 months of 1928.

Average weekly earnings, reflecting as they do part time work and a shorter work week during slack seasons, as well as longer hours during busy periods, naturally show proportionately greater fluctuation, which, for the five year period 1924-28, however, amounted to only about $2.67 between the extremes, and to only 67 cents between the highest and lowest month of 1928.

Relating wage earnings to the movement of retail prices of such articles as generally enter into the wage earner's cost of living, the Conference Board finds that the purchasing power of an hour's work in the manufacturing industries for the year 1928 on the average was from 42 to 45 per cent greater, and that of the weekly pay envelope from 33 to 37 per cent greater than in 1914 in spite of the increase in living costs since that time, and also in spite of the fact that the average work week in 1928 was 48 hours as against 52 hours in 1914.

In the figures relative to the rubber industry, the average hourly and weekly earnings per wage earner of all wage earners, that is skilled and unskilled, male and female workers combined, are given as 46.0 for the average hours work per wage earner and .650 cents per hour as the average earned wage. This is in contrast to the average hourly wage of .570 prevailing in 25 industries in 1928 and shows a considerable advance over the average of .245 cents prevailing in 1914.

Belting Technique

THE last few years have seen more agitation on the technical or laboratory phase of belting than was existent in all its previous history, and while this would seemingly reflect a healthy desire to get at the bottom of the belt problems, it has not, on the contrary, seemed to make the job of putting in belts any more simple, according to an article by Thomas A. Bennett, belting engineer of the U. S. Rubber Co., appearing in *Power Transmission*.

The basic formula in belting mechanics, as derived by the tension on the slack side times 10 raised to the logarithm calculus, is that the tension on the driving side is equal to 0.00758 fa (where f is the co-efficient of friction and the a the arc of contact in degrees).

A review of the derivation of this formula shows that the co-efficient of friction is that of *impending slip*, which would naturally refer to the co-efficient of friction of rest and not the co-efficient of friction of motion. It is apparent at once then that the use of the formula to cover experiments in which belts have been slipping is incorrect and the values of f thus gotten will be more those for brake bands than for belts on pulleys, which presupposes, of course, cling and not slip.

Regardless of the formula, an understanding of the difference between creep and slip is beneficial to any belt man. Creep is directly proportional to the elasticity or elongation of the belt under strain, and since all belt material is necessarily elastic, all belts creep. Without elasticity (meaning the ability to lengthen and shorten under varying stresses) we probably could not have belt transmission, as it would be a physical impossibility to maintain tension to cause adhesion or grip on the pulleys—therefore, this elasticity is a beneficial as well as a necessary property of belting.

The foremost practical law in belting is, "Tight belts are an evil," and conversely it is accepted that economical operation requires slack belts.

The RUBBER AGE

Published on the 10th and 25th of each month.
The Only Twice-a-Month Rubber Publication.

THE PALMERTON PUBLISHING CO., INC.
Publication Office, 1-3 Peace St., New Brunswick, N. J.
Editorial Office, 250 West 57th St., New York City
Telephones: Columbus 2923, 2924

THE RUBBER AGE is published on the 10th and 25th of each month by The Palmerton Publishing Co., Inc., a New York corporation. P. L. Palmerton, President; Earl D. Osborn, Vice-President and Secretary; Peter P. Pinto, Treasurer. Publication Office, 1-3 Peace St., New Brunswick, N. J. Subscription rates: Domestic, $2.00 a year; Canada, $2.50; foreign, $3.00; single copies, 20c. Advertising rates on application.

Contents Copyrighted 1929 by The Palmerton Publishing Co., Inc.

General Manager ..... PETER P. PINTO
Managing Editor ..... J. P. BUSHNELL
Assistant Editor ..... T. H. DAVISON
Circulation Manager.....A. M. SMITH

Representatives in all the rubber centers of the United States, Canada, England, France, Germany and the Middle East.

Bardol
Compound 58900

THE life of an automobile tire, after the first 10,000 miles, depends upon how well the compound was dispersed when made. The best dispersed rubber stocks better resist the action of tension, compression, shear and abrasion, and show less energy loss.

Tire manufacturers have found BARDOL, the new Barrett dispersing agent, to be superior in reducing cracking and increasing the life of tire treads. It activates vulcanization and retards aging and energy loss. BARDOL, for perfect compounding, is as necessary as sulphur.

We will be glad to send samples or have our representative call to give further details.

The Barrett Company

40 Rector Street, New York, N. Y.

Barrett
CHEMICALS

EMBOSSING CALENDERS
For Artificial Leather, Oil Cloth, Carriage and Automobile Covers

DRYING MACHINES
with Copper or tinned iron Cylinders for Cotton Ducks, Drills and Sheetings

The Textile-Finishing Machinery Co.
OFFICE, No. 83 EXCHANGE PLACE
PROVIDENCE, R. I.

PINE TAR
TAR OIL
Made to Specifications
DIRECT SHIPMENT FROM FLORIDA PLANT
Burgundy Pitch - Rosin Oil
Compounding Ingredients
H. T. WEST COMPANY
132 Library St. Chelsea, Boston, Mass.

SPECIAL SOFTENERS

—Better Working Properties before Cure
—Improved Vulcanized Quality
—Lower Raw Materials Cost

TASCO ASPHALT COMPANY

Akron Representative
The F. F. Myers Co.
Akron Savings & Loan Bldg.

HOME OFFICE
238 Wilson Ave.,
Newark, N. J.

Trenton Representative
F. V. Bechtel
289 North Willow St.

Warehouse Deliveries from All Agencies

NEWS of the INDUSTRY

Financial—Business
Building Operations
Personals
New Products

$100,000,000 TIRE CHAIN IS PLANNED BY N. T. D. A.

Plans for a $100,000,000 chain of retail tire stores were announced by the board of directors of the National Tire Dealers Association at a meeting in Chicago on July 23, according to newspaper reports. The scheme involves a merger of independent dealers now members of the association into a new organization to be known as the United Tire Stores Company of America.

Hubert V. Eva, president of the association, has said that the purpose is to effect economy of operation and to meet changed conditions brought about by the growth of special outlets such as mail order houses and chains of tire and super-service stations. The new group may merchandise lines of tires carrying its own brands. Details of the merger will be released at the time of the association's annual convention in Chicago from November 11 to 14.

BOLTA RUBBER COMPANY BUYS MILL AT LAWRENCE

The Bolta Rubber Company, British manufacturer of hard rubber products, has purchased the five-story building at Lawrence, Mass., known as Mill 3A of the Everett Mills group. The sale was consummated at the Boston office of the Everett Mills on August 1 and brought to an end negotiations extending over a period of several months.

The Bolta Rubber Company comes to this country from abroad, where it has operated successfully for 10 years. Operations in the Lawrence plant will get under way in September and will afford employment to 500 persons when capacity is reached.

John Bolton, president of the corporation, is expected to reach the United States within a few days. With him will come six experts who have been given permission by the United States Department of Labor to remain in this country one year to teach local workmen special processes used in the manufacture of the company's products. Milton Shaw of New York is vice-president of the company.

M. E. A. Buyers' Guide

A quick reference buyer's guide for virtually all classes of automotive products has been issued by the Motor and Equipment Association, which includes many tire and rubber manufacturers in its membership. More than 400 products are listed, together with names of company executives, products made, wholesale members geographically listed, and other data. Products listed include motors, bodies, parts, accessories, production equipment, service equipment and materials.

Akron Companies Turn Down Niagara Falls Voyagers

The second request in one week to make a huge rubber ball in which a person could ride over Niagara Falls was recently turned down by the Goodyear Tire & Rubber Company. The latest request came from a 69-year-old Philadelphia woman, who announced she intended to try the stunt, and the other call came from a New York man and was promptly refused.

A year ago Jean Lussier, Canadian daredevil, tried to interest Akron rubber companies in such a contrivance, but was forced to buy the material and make the ball himself. He went over the falls successfuly, but is said to have found the financial returns for risking his life hardly enough to pay for the expense of making the ball.

Tire Price Cut Confirmed

A definite report has been received from Akron that the Goodyear Tire & Rubber Company has reduced prices on second line tires by 2½ to 4 per cent, confirming rumors which have been current for weeks. The tires affected include the Pathfinder line and comprise largely the output going to mail order houses. The Firestone Tire & Rubber Company is said to be making the same reduction on second line tires to dealers.

2,000 at Republic Outing

About 2,000 employes and members of employes' families attended the tenth annual picnic of the Republic Rubber Company at Idora Park, Youngstown, O., July 23. The program began at 10 o'clock in the morning and lasted throughout the day. The outing was one of the most successful ever held by the company due to the careful arrangements of the general committee.

In the item on Page 439 of the July 25 issue of this publication, the statement was made that the series of speed reducers made by the Foote Brothers Gear & Machine Company, by which a reduction of 19,025,-344.8 to 1 could be obtained, were being offered to the rubber trade. This was in error, as the particular series described were for exhibition purposes only and were not intended for sale.

BAY CITY RUBBER FIRM TURNS OUT FIRST TUBES

The first inner tubes to be perfected by the Bay City Rubber Company, Bay City, Mich., were released last month and exhibited in the windows of local dealers. These inner tubes, which are said to be practically pncture proof, mark the culmination of 11 months of work. Production of the tubes, which are now being placed on the market, has been delayed because of the time necessary in training new employes.

The first unit of the Bay City factory, recently completed, will produce approximately 3,000 inner tubes a day. Seven other units will be gradually added as the demand for the product increases and as fast as new men can be trained in the work.

Distribution of the Bay City inner tubes will be entirely within the Bay City territory at first, according to the company. Efforts will be made to fill all local demands and other outlets will be filled afterward.

Change Tire Packing Rule

The Traffic Department of the Rubber Manufacturers' Association has advised all tire manufacturing members that its efforts to secure a change in packing specifications which will permit the shipment of pneumatic tires in less than carload lots, unwrapped, have been successful. The Traffic Committee appeared before the Consolidated Freight Classification Committee in April of this year in support of their argument that shipments of the kind referred to should be permitted at the option of the manufacturer. The Classification Committee has now adopted this suggestion and the new ruling will become effective on or about September 14th of this year.

Wildman Plant Sale

The public auction sale of the land, buildings and equipment of the Wildman Tire & Rubber Company, Port Clinton, O., will take place on the premises of the defunct company on the morning of August 15. The land and buildings will be offered as a whole and also in separate parcels to suit bidders, but the machinery, tools and equipment will be sold piece by piece. The auction will be conducted by the Industrial Plants Corporation, New York City.

Goodrich to Hold Picnic

The B. F. Goodrich Company will hold its annual picnic at Euclid Beach Park, Cleveland, O., on August 12, with about 20,000 employes and from 30,000 to 40,000 members of their families taking part in the sports and other events scheduled. The affair is said to be the outgrowth of the day in 1888 when 100 employes of the company celebrated the return of Dr. B. F. Goodrich from Europe.

TIRE ACCESSORY MAKERS URGE BETTER STATISTICS

A meeting of the Tire Accessories and Repair Materials Committee of the Rubber Manufacturers Association, was held at the Akron City Club, Akron, O., on July 11. The meeting was attended by sixteen representatives of twelve tire manufacturing companies.

The committee requested the association in the future to collect and to report more detailed figures concerning the quarterly sales value of tire accessories and repair materials. It is expected that publication of these figures will begin with the association's report for the third quarter of this year.

Georgia Approves Goodrich Site

With the approval by Governor Hardman of a measure permitting the city of Atlanta to sell the Hemphill avenue site to the B. F. Goodrich Company, the last obstacle in the way of an early start on the company's $1,000,000 Georgia tire plant has been removed. The bill was passed by the Georgia House of Representatives on July 17, approved by the State Senate a few days later, and signed by the governor on July 24.

Hendrie Firm Dissolved

The Hendrie Rubber Tire Company, Trenton, N. J., which formerly maintained a tire and tube factory in California, has made application to the secretary of state of New Jersey for papers of dissolution. The company had been incorporated under the laws of New Jersey with Thomas H. Thropp of Trenton as president.

Pocono Erects Additions

The Pocono Rubber Cloth Company, Trenton, N. J., has erected two one-story factory additions for the manufacture of rubber cloth and will shortly install new machinery. The company is operating night and day.

General Plane is Attacked By Bull on Indiana Farm

When weather conditions forced Lieutenant A. C. Lybarger, commander of the sky fleet of the General Tire & Rubber Company, to land his bright orange Aristocrat monoplane on the farm of W. C. Wright near Kokomo, Ind., he found himself confronted by a large bull. The maddened animal pierced the fuselage of the plane with its horns and bent the struts before the farmer could intervene.

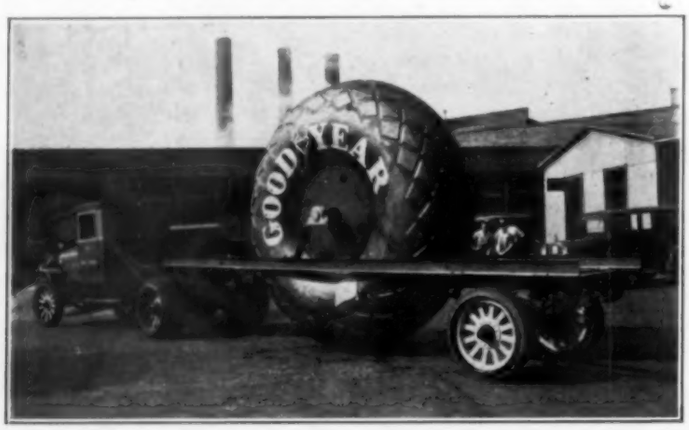
The damage to the plane was repaired without serious difficulty, and the event made an item that has been securing considerable newspaper space for the company's publicity department.

J. Park Patterson

J. Park Patterson, former branch manager of the Firestone Tire & Rubber Company, died July 22 at his home in Chicago, Ill., at the age of 56. He had been manager of the Firestone branches in Chicago, St. Louis and Cincinnati and was widely known in rubber circles. He was once manager of the Firestone branch at Buenos Aires and later was sales manager at the California plant.

Burial took place July 24 at East Palestine, O., his boyhood home. The pallbearers were L. R. Jackson, Firestone sales manager; E. F. Parker, western sales manager; C. H. Gerhold, manager of special goods department; Fred J. Cast, in charge of manufacturers sales; S. R. Brink, manager of the Chicago branch; L. G. Fairbanks, truck and bus division manager; and Joseph E. Mayl, former Firestone sales executive and now southern division manager for the Goodyear Tire & Rubber Company.

Goodyear Builds the World's Largest Tire



THIS giant pneumatic tire, produced in the Akron factory of the Goodyear Tire & Rubber Company, will be displayed throughout the country mounted on a trailer behind a specially designed bus. The tire, which is 12 feet high and 4 feet thick, was built in three months. With its wheel, it weighs 1,800 pounds, the tread and wheel each weighing 600 pounds and the inner tube 125 pounds. The fabric used amounted to 150 pounds. A well-known airplane builder has said that eventually airplanes will be constructed of sufficient size to require casings of these dimensions.

Wilson Rubber Stock Increase

The Wilson Rubber Company, Canton, O., manufacturer of rubber gloves and other articles, has increased its common stock from 3,000 shares of $100 each to 50,000 shares of no par value. Its capitalization of $200,000 in preferred stock remains unchanged.

General Sales Make Record

The General Tire & Rubber Company has enjoyed the largest six months' business in its history during the first half of 1929, domestic shipments being 20 per cent above those of last year and general export business 46 per cent higher. It has been estimated that the company will show earnings of approximately $34 a share this year on its outstanding common stock.

Hood Declares Dividends

The Hood Rubber Company, Watertown, Mass., on August 1 paid the regular quarterly dividends of $1.85 on its 7½ per cent preference and $1.75 on its 7 per cent preferred stocks to shareholders of record July 22. The Hood Rubber Products Company has declared the regular quarterly dividend of $1.75 on its preferred stock, payable September 1 to stock of record August 20.

Endicott Johnson Profit

The Endicott Johnson Corporation, manufacturers of rubber and other shoes, golf balls, etc., reports for the six months ended July 6, 1929, net profit of $438,665 after all charges, equal to 16 cents a share on 405,360 shares of common stock. This compares with $1,677,284, or $3.16 a share, in the six months ended June 30, 1928. After payment of common stock dividends this year, there was a deficit of $949,209 as against a surplus of $270,264 in 1928.

Rubber Stocks Inactive

No great activity was in evidence with relation to the stock issues of rubber companies on the various exchanges. New lows were made by Fisk common and preferred, General preferred, Miller common and preferred, Norwalk and Seiberling, while only Pirelli rose to new high levels. Prices of shares of leading rubber companies on August 5 compare as follows:

	Last Price		High	Low
	Aug. 5	July 20	—1929—	
Ajax	4¾	5⅛	11¼	4½
Falls	—	6	11⅜	5
Faultless	—	30	39⅞	32½
Firestone	240	260¼	309	220⅛
do. 6% pfd.	—	108½	111	108
Fisk	7⅜	8	20⅛	7½
do. 1st pfd.	40	47	72½	40
General	255	270	298	236
do. pfd.	95	95	102	94
Goodrich	75¾	75⅝	105⅝	73
do. pfd.	—	111½	115⅛	111
Goodyear Com.	118¾	119⅝	154½	112
do. pr. pfd.	101⅝	101⅞	104⅞	101
Hood	—	24	27¼	18¼
India	40⅛	48½	73	39
Intercontinental	—	9½	14¼	8⅛
Kelly Springfield	12⅛	13⅛	24	11
do. 1st pfd.	—	75	100	75
Lee	13⅛	13½	25	10
Miller	14¼	17⅛	28¾	13½
do. pfd.	50	55	83	49
Mohawk	39	45	66	39
do. pfd.	—	81	90½	81
Norwalk	2¼	2⅝	6⅛	2⅛
Seiberling	33	34⅞	65	31½
do. pfd.	—	104	107⅞	104
U. S. Rubber	47⅛	50	65	42
do. pfd.	73¾	75	92½	73

Names in the News

HERBERT E. SMITH was elected a member of the board of directors of the Dominion Rubber Company at a recent meeting.

STEPHEN T. MILES, former assistant plant manager, has been made plant manager of the Fairfield Rubber Company, Lancaster, O., manufacturers of rubber soles and heels. He has had nine years' experience with this firm, prior to which he served nine years as laboratory assistant and calender room foreman at the Hewett Rubber Company, Buffalo, N. Y.

H. A. FARR, for several years in charge of tire sales for the United States Rubber Company on the Pacific coast, has been appointed assistant to L. M. SIMPSON, general sales manager of the tire department, with headquarters at the general offices, 1790 Broadway, New York City. J. B. MAGEE, who has been branch manager at Los Angeles, has succeeded Mr. Farr as manager of district tire sales in the Pacific coast division

M. F. O'NEIL, GEORGE C. DROHAN, W. E. GREEN, P. H. SLOAD, M. R. SUTHERLAND and R. W. GOVE, officials of the Firestone Tire & Rubber Company, traveled by the company's new Ford airplane to Bay City, Mich., on July 13 to inspect a recently opened super service station. The ship was piloted by W. M. MCCONNELL.

MAJOR C. H. MARANVILLE, who joined the General Tire & Rubber Company sky fleet of eight airplanes as commander on May 18, has resigned from his connection with the company. LIEUTENANT A. C. LYBARGER is now in command of the fleet.

COLONEL CHARLES A. LINDBERGH was a visitor to the hangar of the Goodyear Tire & Rubber Company at Los Angeles on July 17. He made a flight in the Goodyear blimp, the *Volunteer*, handling the controls himself for a while, although it was his first experience with this type of aircraft.

CLEMENT M. KEYS, a director of the B. F. Goodrich Company and president of the Curtiss Wright Corporation, has returned to this country after attending the sessions of the International Chamber of Commerce at Amsterdam.

ALBERT A. GARTHWAITE, general manager of the Lee Rubber & Tire Corporation, Conshohocken, Pa., was a passenger on the first westbound plane of the new air-rail service opened last month. After leaving the coast, he visited tire dealers at Phoenix, Ariz., accompanied by C. D. PATE, southwestern manager of the company.

T. G. GRAHAM, vice-president of the B. F. Goodrich Company, made his first visit to the Pacific Goodrich Rubber Company factory at Los Angeles last month. He traveled from Ohio to California by the recently opened air-rail route.

Visits America

The Right Honorable Sir Eric Geddes, chairman of the Dunlop Rubber Company, Ltd., and allied companies, arriving at New York on the Berengaria August 2. Sir Eric, who has long been associated with the rubber industry, has been quoted in American newspapers several times since his arrival here on the subject of world peace and better Anglo-American relations. He is a brother of Sir Auckland Geddes, former ambassador from Great Britain to the United States.

H. F. PALMER, chief chemist of the Firestone Tire & Rubber Company, has been spending his vacation in Michigan. He drove there from Akron with his family.

JOSEPH F. SCHNUGG was elected an assistant treasurer of the United States Rubber Export Company, Ltd., at a meeting of the board of directors of that company a few weeks ago.

J. W. BICKNELL, managing director of the United States Rubber Plantations, Inc., has fully recovered from the operation for appendicitis to which he submitted at San Antonio, Tex., a few weeks ago.

G. S. WILSON, purchasing agent of the Wilson Rubber Company, Canton, O., was a speaker at the meeting of the Canton Civitan Club at the Courtland Hotel in that city last month. He described the process by which rubber gloves are made and how they are distributed throughout the world.

R. H. COCHRAN has resigned his position in the safety department of the Kelly-Springfield Tire Company, Cumberland, Md. He has also given up his post as chairman of the slide committee of the Rubber Section of the National Safety Council.

C. A. COLLINS, manager of the public relations department of the Firestone Tire & Rubber Company, returned to Akron last month after a trip to Miami, Fla., in the company's new Ford monoplane.

J. J. GOLDIE has been elected president of the Generator Club, a social organization for heads of departments of the General Tire & Rubber Company. JOHN INK has been chosen vice-president and RANDALL BROTHERS, secretary-treasurer.

JOHN S. BATHRICK has been appointed district manager of the Fisk Tire Company, in the district including Portland, Ore., Spokane, Wash., Boise, Ida., and neighboring communities. J. T. Henry has been appointed as assistant district manager for the same territory.

HARVEY S. FIRESTONE, SR., president of the Firestone Tire & Rubber Company, is recovering from his recent cold, which threatened to turn into pneumonia toward the end of July.

C. JAMES DUNNE, plant manager for the Aetna Rubber Company at Ashtabula, O., has resigned from that position without making any announcement as to his future plans. He came to the company in 1922, having been previously connected with the Brunswick-Balke-Callender Company, Muskegon, O.

H. B. POLSON, president of the Polson Rubber Company, is preparing to move into his new home, built in early American style, on the Pioneer Trail, Aurora, O.

MORRIS BERNET, son of JOHN J. BERNET, president of the Erie Railroad, was a visitor to the plants of the Goodyear Tire & Rubber Company and the Goodyear-Zeppelin Corporation last month. Company officials entertained him with a flight in one of the Goodyear dirigibles.

C. EDWARD MURRAY, JR., president of the Murray Rubber Company, Trenton, N. J., spent a few weeks recently in a business trip through the middle west.

CATALPO
for
Footwear

Rubber News Around the World

GEORGE SPENCER MOULTON FORMS FRENCH COMPANY

A company has just been organized under the name of the Societe Francaise des Caoutchoucs Spencer Moulton for the purpose of manufacturing the line of rubber goods now made in England by George Spencer Moulton & Company, Ltd. The new firm has established headquarters at 103 Avenue Parmentier, Paris.

The capital of the French concern is to be 500,000 francs in 1,000 shares of 500 francs each, of which 500 have been allotted to the English company. The directors include Alexander Spencer, H. P. Lambert, J. Crosland, Xavier de la Chapelle, and Paul-Xavier Morton de la Chapelle. The British company has manufactured rubber goods of every type for 21 years, but it recently disposed of its tire and tube business to the Trowbridge Tyre & Rubber Company.

Another French company just incorporated is the Societe de Ressemalage Rapide en Caoutchoucs. The directors include Xavier Alfred de la Chapelle and Paul-Xavier de la Chapelle, who are also directors of the French Spencer Moulton company, and the headquarters are at the same address in Paris. The purpose of this firm is to exploit an invention for re-soling leather footwear with rubber vulcanized in place on the old leather sole without scorching it.

BRITISH SCHOOL TEACHES TECHNOLOGY OF RUBBER

An important extension to the Newton Heath Technical School, Manchester, was opened by Lord Colwyn, president of the Institution of the Rubber Industry, on July 8. At the suggestion of the Institution, a part of this school has been set aside for classes in rubber technology. The rubber workshop has been well equipped with small scale machinery, the trade having contributed over £1,000 toward this end.

Already 20 boys have started their tuition in the school and have been promised positions on the completion of a two years' full time course. At the end of this period they will attend the school on one day a week for a further two years, when they will have an opportunity of being graduated at the Manchester oCllege of Technology.

After the opening of the school, the Institution entertained the Lord Mayor and members of the Manchester Education Committee to luncheon, as well as some of the distinguished members of the Society of Chemical Industry, which was holding its annual conference in Manchester during that week. Professor G. Stafford Whitby was also presented with the first Colwyn gold medal by Lord Colwyn for scientific work, and F. G. Stretch, the ex-honorary secretary of the Manchester Section of the I. R. I., was given a gold cigarette case.

To Make Tires in Peru

The government of Peru has granted a concession giving the monopoly of the manufacture of pneumatic tires in that country to Ladislav Grana, Carlos Leguia and Jorge Borda. The concessionaires are understood to have deposited a sum of money with the government treasury, which is to be forfeited if the proposed factory is not established within a certain time.

To Attempt Atlantic Flight

Having traveled almost half way around the world, Captain Charles Kingsford Smith and his associates are planning a flight from England across the Atlantic Ocean to the United States, according to the B. F. Goodrich Company, which has just furnished two new tires for their airplane, the Southern Cross. The first set of Goodrich tires were used on the plane during 60,000 miles of flight.

Canada Uses More Rubber

An indication of the growth of the rubber manufacturing industry in Canada is contained in a report stating that imports of crude rubber into the Dominion during the 12 months ending last April totaled 80,458,531 pounds as compared with 59,158,840 pounds in the preceding 12 months. Imports from the United States totaled 75,264,245 pounds, an increase of 21,322,411 pounds.

I. R. I. Examinations

Of the seven candidates who took the associateship examination of the Institution of the Rubber Industry last March, none received less than 70 per cent of the possible marks awarded for answers to the questions. The candidates were W. Holland-Bowyer, J. H. Carrington, F. H. Cotton, F. A. Jones, J. G. Robinson, G. C. Russell, and E. O. Skinner.

Synthetic Tires Tested

Synthetic rubber tires have recently been tested against natural rubber tires (both made by the Peters Union, Frankfort, by identical processes) and they were found to behave just as well as the natural. When they became hot, the abrasion resistance of the synthetic tires was found to be better than that of the particular natural rubber tires with which they were compared. The resistance to aging, however, is still unknown and is a matter for future investigation. At present the cost of synthetic rubber, prevents the product from entering into commercial competition with natural rubber, which is only about one-third the price.

CABLE MAKERS' AGREEMENT SUCCESSFUL IN ENGLAND

At the jubilee meeting of W. T. Henley's Telegraph Works Company, recently held in London, Sir George Sutton, the chairman, referred to the results of two years' working of the cable-makers' agreement. His report was, on the whole, favorable; notwithstanding big difficulties the scheme has achieved considerable success.

"The benefits already realized," said Sir George, "have been considerable. The old individualistic idea that every firm must guard jealously its own small preserves of method and discovery is slowly giving place to a common fund of knowledge and experience. And while it is perhaps difficult to get the habit of considering the interests of one's allies as the interests of oneself, the disposition to do so is stronger and more general than two years ago.

"A more substantial result of the agreement has been the achievement of lower costs of production through improvements in design and manufacture. The corollary is greater competitive power and more business."

HARDIE TO MANUFACTURE FOOTWEAR IN AUSTRALIA

The Hardie Rubber Company, Ltd., Sydney, has acquired the sole manufacturing rights in Australia of all specialties of the North British Rubber Company, Ltd., Edinburgh, the largest general rubber works in the British Empire. The shoe production manager of the North British Rubber Company, N. T. Hay, is now at the Hardie company's factory at Paddington, Sydney, supervising expansions and installations of new equipment.

Four years ago a company was organized by which the Dunlop Rubber Company of Australasia, Ltd., and the North British Rubber Company, Ltd., became associated in the manufacture of sandshoes. Since the amalgamation of Dunlop with Perdriau and Barnet Glass, however, this arrangement has been ended.

CATALPO
for
Mechanicals

Rubber Goods and Specialties

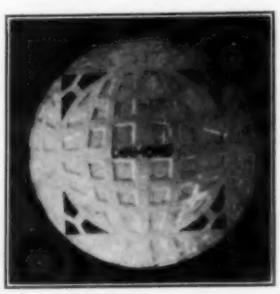
Bathing Cap

The line of "U. S." bathing caps for 1929, now being offered by the United States Rubber Company, 1790 Broadway, New York City, includes many attractive novelties in moulded caps, pure gum caps, plain divers, fancy trimmed caps, and hand-made numbers. Among them is the new moulded

aviator cap, designed with a strap to go under the chin and to resemble the appearance of an aeronautical helmet. Other "U. S." products for summer bathing that have been steadily gaining in popularity during the past few seasons are the beach hat and the cape with circular skirt effect, coolie coats, bathing blazers, belts and bathing bags. "U. S." swimming rings and the "Waterboy" inflatable animals were added to the line a year ago.

Colored Golf Balls

New and distinctive markings are a feature of the new golf balls being offered by the Worthington Ball Company, Elyria, O. The company's Black Diamond new mesh foursome colored golf balls supply individual color markings for each member of a foursome. The colors given the design and



name shown in the illustration are either black, red, green or orange. According to the manufacturer, this color marking also gives the ball the appearance of being larger on the tee and on the fairway, and on the putting green the golfer has something to attract his eye, which is essential in good putting. These balls are packed with three of each color to the dozen box.

High Heel Bathing Shoe

Among the extensive line of bathing accessories offered by the United States Rubber Company, 1790 Broadway, New York City, is the recently introduced "Chic" high heel bathing shoe. Like all other women's bathing shoes manufactured by the United States Rubber Company, this may be had in red, blue, black, green, white or sunburn. It is equipped with a regular heel and is said to be finding a popular reception among women bathers already.

Airlox Inner Tube

As a companion item to the Polson puncture-sealing super tube, the Polson Rubber Company, Garrettsville, O., has brought out the Airlox, a tube with the same air retention, but not the puncture-sealing ability of the former tube. These new tubes are made on oversize mandrils and are the same size as the tire for which intended. There

is, therefore, no stretch except the small percentage necessary to cover the variation in inside measurements of various makes of tires of the same size. The Airlox tubes are of the same thickness as the wall stock used on the puncture-sealing tube and are made of as nearly pure rubber as possible. To make air retention doubly sure, the tubes are lined with one thickness (about 1/32-inch) of black rubber of similar cure to that used on the tread of the puncture-sealing tube.

Trimming for Upholstery

A rubber moulding, beading, gutter or the like for upholstery and vehicles, devised by E. Benest, 7 Buckingham avenue, London, England, is of tubular formation and is constructed of a semi-circular cross-section with a longitudinal slot therein, and with the inner edges of the slot projecting into the interior of the moulding so as to present an undercut surface for anchoring the nails. The nails used have domed heads to coact with the moulding.

G-T-R Balloon Tire

To round out its line of tires, the Miller Rubber Company of New York, Akron, O., has developed this new Miller Geared-to-the-Road balloon casing. Handsome in appearance and large in size, it is also said by the manuafcturer to have a tread that will outwear that of any standard tire in its

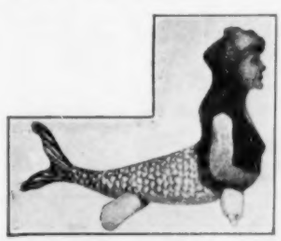
price class. The tire carcass is claimed to be as strong and durable as the tread and able to withstand overload and under-inflation. These casings have been tested on the Miller test fleet on the highways of Florida and the results have been satisfactory in every respect. The G-T-R tire, as it is also called, has a price range between the Miller De Luxe casings and the lower-priced Medalist tires which the company introduced last October.

Nursery Sponge

A novelty in a nursery sponge that has been recently introduced in England is entitled, "The Singing Bird." It is modeled solidly from rubber sponge of varying tints —yellow for the canary, green for the leaves, and brown for the rock on which the bird rests. When compressed in the hand, the sponge emits a squeaking that has proven very popular with the youngsters.

Havvaride Float

A new range of large colored models of Havvaride bathing floats has been recently announced, including such styles as the mer-



maid, sea serpent, walrus, tiger, horse, swan and boat. All are made of specially strengthened rubber for sea use and have attained great popularity at English coast resorts. They are manufactured by J. G. Franklin & Sons, Ltd., at the Birkbeck Rubber Works, London, E. 8, England.

Current Crude Rubber Items

PLANTATION PROSPECTS GENERALLY IMPROVING

The announcement that yet another well-known plantation company has got its all-in rubber production costs down to under 6d. (12 cents) per pound is a reminder of the growing promise of the rubber plantation industry. Abolition of restriction has made the companies turn their attention to internal economies, and many of the best-managed plantations have now got their costs on to an advantageous basis. The aim is 6d. per pound "all-in," or less if possible.

Many producers have cleaned their estates and have got them into the healthiest possible condition. The reduction of costs and the outlook for a gradually increasing price of the commodity are very important, indicating, as they do, that the plantation industry has already got its feet on the first rung of the ladder of renewed prosperity. Perhaps it is because the dawn of better days can be seen that a number of new rubber plantation units are being discussed and formed, and that capital is being directed, beneath the surface, into new acquisitions of rubber estates. The schemes afoot for greater automobile production in Europe cannot but tell on the rubber situation.

A recent compilation shows that crude rubber stocks at Hamburg, Germany, increased from 4,772 tons at the end of September, 1928, to 8,867 tons by March, 1929.

Elected to Exchange

H. F. Dudok van Heel, of L. Wurfbain & Company, Amsterdam, Holland, and P. P. Brosnan, of Thomson & McKinnon, New York City, have been elected members of the Rubber Exchange of New York, Inc. Corporation privileges have been granted to Thomson & McKinnon, L. Wurfbain & Company, and Faulkner & Winsor, Ltd., London, England.

FUTURES TRADING DULL ON THE RUBBER EXCHANGE

Despite the fact that trading in futures on the Rubber Exchange of New York fell off to almost negligible proportions at times during the past fortnight, price quotations have remained steady and on the final day were higher for most positions than at the close of the preceding two weeks. On four days during the period, only one of which was a Saturday, less than 75 contracts were sold during the trading session.

The market was especially dull on the final day because of the bank holidays in England during which the London and Singapore markets remain closed. Sharp declines occurred in a flood of selling on August 2, the most active day of the period. The daily fluctuations in prices on the Exchange and the daily volume of sales were indicated in the table below.

Closing Prices on Rubber Exchange of New York, Inc.

FROM JULY 22 TO AUGUST 5, 1929

		Spot	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Sales*
July	22	20.80	21.10	21.40	21.70	22.00	22.40	22.60	22.80	23.00	23.30	23.50	23.70	——	649
	23	20.70	20.90	21.40	21.60	22.00	22.40	22.50	22.70	22.90	23.00	23.10	23.50	——	370
	24	20.70	20.70	21.30	21.40	21.80	22.10	22.40	22.60	22.90	23.00	23.10	23.30	——	330
	25	20.70	20.80	21.40	21.60	22.10	22.40	22.60	22.80	23.00	23.20	23.30	23.60	——	149
	26	21.10	21.10	21.60	21.80	22.10	22.50	22.70	23.00	23.30	23.50	23.70	23.90	——	428
	27	21.00	21.00	21.50	21.70	22.10	22.40	22.60	22.90	23.00	23.30	23.50	23.70	——	71
	29	20.60	20.60	21.40	21.60	22.00	22.30	22.50	22.80	23.00	23.20	23.30	23.60	——	28
	30	20.70	20.70	21.40	21.50	22.00	22.30	22.50	22.80	23.00	23.20	23.30	23.50	——	176
	31	21.00	21.00	21.30	21.50	22.00	22.40	22.50	22.70	22.90	23.20	23.40	23.60	——	70
August	1	21.10	21.10	21.50	21.80	22.20	22.60	22.80	23.10	23.20	23.50	23.70	23.90	24.10	187
	2	20.60	20.60	21.20	21.40	21.80	22.10	22.30	22.60	22.80	23.00	23.30	23.50	23.70	757
	3	20.50	20.50	21.10	21.20	21.60	22.00	22.20	22.50	22.60	23.00	23.20	23.50	23.70	182
	5	20.60	20.60	21.10	21.40	21.80	22.20	22.40	22.60	22.80	23.10	23.40	23.60	23.80	72

*In lots of 2½ tons each

RUBBER ESTATE FORMED WITH $2,000,000 CAPITAL

The flotation of a rubber plantation company, a rare thing during the past few years, is now becoming slightly more common as a result of the steadily improving outlook for producers. The most important undertaking floated lately is entitled the Rubber Estates of Malaya. It has been formed with a capital of £400,000 ($2,000,000) in shares of £1 issued at par to acquire an area of 6,631 acres, 6,370 acres being planted. Of this total, 3,950 acres represents mature rubber, giving the exceptionally heavy production of 500 lbs. per acre. Estimated crops are shown at 1,404,750 lbs., in the first year, rising by the seventh year to 2,462,500 lbs., and all-in costs are estimated at 7¼ d. in the first year.

The purchase price of the estates to the company is £344,227; the intermediary syndicate acquired them for £309,195, out of which it will pay preliminary expenses up to a total of £30,032, leaving £5,000 as its profit on the transaction. As the total planted acreage to be acquired will be 6,400 acres, the cost to the company of the estates will amount to about £53 16s. per planted acre. The difference between the issued capital and the purchase price, amounting to £55,773, less brokerage, will be available as working capital.

RUBBER PLANTER HEADS DRIVE AGAINST MALARIA

A. W. Still, of the Rubber Growers' Association, was elected chairman of the Ross Institute Industrial Anti-Malarial Advisory Committee at the opening meeting recently held in London.

Sir Malcolm Watson opened a discussion of the important subject of how the committee could best help tropical industries such as the rubber industry, with their malarial problems. He emphasized that without an exact knowledge of the habits of the mosquitos which carried the disease it was difficult to deal with them, and in some cases an impossible task.

SCRAP RUBBER

We buy and sell all grades of Scrap Rubber
Let us have your inquiries
JOSEPH CHALFIN, Inc., 274 Madison Ave., New York, N. Y.
A. B. C., fourth, fifth and sixth editions. Lieber's and private codes used. Waste Merchants' standard code. Bentley's code.
Cable Address—Chalfino, New York

INTERNATIONAL PULP CO., *41 Park Row, New York, N. Y.*
SOLE PRODUCERS OF PURE **ASBESTINE** SPECIALLY PREPARED FOR USE IN RUBBER
Covered and Protected by Letters Patent Registered at U. S. Patent Office, Washington, D. C.
LIBERAL WORKING SAMPLE FURNISHED FREE

RUBBER PROOFERS GROUP HOLDS BOSTON MEETING

A meeting of the Rubber Proofers Division of the Rubber Manufacturers' Association was held on July 8 at the Copley-Plaza Hotel, Boston, Mass. The session was attended by 18 representatives of 11 member companies.

On the following day, members of the division were guests of the Plymouth Rubber Company at a golf outing at the Pine Brook Valley Country Club.

GOODYEAR BUILDS THREE DOCKS FOR DIRIGIBLES

Erection of three small hangars or docks for the dirigibles of the Goodyear Tire & Rubber Company has been started at Gadsden, Ala., New Bedford, Mass., and Los Angeles, Cal. The docks will be 200 feet long, 72 feet wide and 75 feet high, and the cost of each structure is estimated at $350,000.

The company now has ships in operation at New Bedford and Los Angeles. An eight-passenger ship, the *Defender*, has just been completed and will probably be sent to the Alabama city.

Firm Changes Name

The Skinner Boot & Reliner Company, Columbus, O., which has been engaged in the manufacture of tires and other rubber products for the past nine years, has changed its corporate name to the Skinner-Goodwin Boot and Rubber Company, of Dayton. The new incorporators are William G. Goodwin, Jordan C. Skinner and Stanley B. Robbins. The plant of the company has recently been remodeled, and $25,000 worth of new machinery has been installed.

Firestone Buys Peoria Site

The Firestone Tire & Rubber Company is reported to have concluded the purchase of property in Peoria, Ill., for the erection of headquarters and warehouse facilities to serve the Central Illinois territory. Construction work is expected to begin at once.

Crescent Completes Addition

The new addition to the plant of the Crescent Insulated Wire & Cable Company, Trenton, N. J., has just been completed. The new building is three stories in height and cost $60,000.

Goodyear Gets Patents

The Goodyear-Zeppelin Corporation has been granted patent rights on a rigid airship hull which will be used for the construction of the dirigibles being built for the United States Navy. The company was also assigned a patent for the treatment of outer covers of aircraft. The Goodyear Tire & Rubber Company at the same time was assigned patents on a tire trimming machine, an attachment for a cotton gin and a squeegee guider.

Murray Wins State Contract

The contract for furnishing pneumatic tires and tubes to be used on state-owned automobiles in New Jersey for the coming year has been awarded by the State Purchasing Commission to the Murray Rubber Company, Trenton, N. J., which made a low bid of $36,349. A preliminary announcement was published in newspapers to the effect that the United States Rubber Company had been given the contract for a bid of $31,817.67 on pneumatic tires and $5,198.27 on tubes, but this was rescinded after a check-up. The United States Rubber Company was awarded the contract for solid tires at $3,677. There were 23 companies bidding for the contracts.

Omo Moves New York Office

The Omo Manufacturing Company, Middletown, Conn., makers of dress shields, drug sundries, bathing goods, etc., has announced the removal of its New York office from 232 Madison avenue to 150 Madison avenue. The telephone number has been changed to Bogardus 4793.

CATALPO
for
Frictions

STANDARDS IN
RUBBER COMPOUNDING

MICRONEX
The King of Rubber Pigments

FUMONEX
The Stainless, Resilient, Easy Milling Carbon

VELVETEX
The Economical Carbon Diluent

STEAREX
The Stearic Acid for Rubber

Complete details and information from Technical Service Department

BINNEY & SMITH CO.
41 EAST 42nd ST., NEW YORK, N. Y.

GOODYEAR BUYS PLANE TO TEST NEWEST TIRE

The Goodyear Tire & Rubber Company has purchased a single-motored Fokker airplane for general business purposes and for testing the company's new Musselman "doughnut tire." The ship, which is reported to have cost $25,000, will be housed in the new Zeppelin dock now under construction at the Akron Municipal Airport.

Last month L. O. Guinther, airplane tire sales manager for Goodyear, found it necessary to charter a plane from Air Services, Inc., in order to fly to Buffalo and demonstrate the new Goodyear tire to officials of the Consolidated Aircraft Company there. The Musselman tire carries only eight pounds of air pressure and is designed to cushion landings by taking much of the load off the plane.

Goodyear is the fourth Akron rubber company to buy airplanes for commercial use. The General Tire & Rubber Company has a fleet of seven Aristocrat planes, the Firestone Tire & Rubber Company owns a Ford transport, and the B. F. Goodrich Company is now supervising construction of a new Lockheed-Vega at Burbank, Cal.

Viking Tire Service Certificate

The Combination Rubber Company, Trenton, N. J., has announced a new "Certificate of Service" plan in connection with the sale of its Viking tires. The certificate guarantees that the service obtained rom Viking tires will not be below a certain minimum. No premium is charged the dealer for the protection afforded and, if the tire fails to give the service for which it is warranted, the user is not asked to accept a repair job.

The Philadelphia Rubber Works Company

Manufacturer of

RECLAIMED RUBBER

of

STANDARDIZED QUALITY

NEW YORK
52 Vanderbilt Ave.

AKRON, OHIO

OAKS, PA.
(Montgomery County)

CLASSIFIED ADVERTISING

Five cents a word, minimum charge $2.00, payable in advance.
Address replies to Box Numbers
THE RUBBER AGE
250 West 57th St., New York City

SITUATIONS WANTED

TEN YEARS experience manufacturing Baby Pants, Bathing Caps, Aprons and Novelties. Can design, originate and improve methods. Factory and office ability. Desire new connection. Age 33; Married. Address Box 525, THE RUBBER AGE.

RUBBER CHEMIST, degree in Chemical Engineering. Development or compounding work. Experience includes tires, tubes and mechanical rubber goods as chief chemist and factory production work. Practical and dependable. Desire to make permanent connection with a responsible company. Address Box 532, THE RUBBER AGE.

HELP WANTED

AN ESTABLISHED company in the Eastern district desires experienced chemist for laboratory-factory control work on tires and mechanicals. Applicants must be familiar with chemical and physical testing of materials. Man in this work age 25-35 with some compounding and factory experience preferred. Applications should contain training and experience to date, present employment, and salary expected. Address Box 526, THE RUBBER AGE.

FIRMLY established manufacturing company in middle-western city, offers splendid opportunity to young man not over thirty-five years of age to make a good place for himself in its factory. Success in the job will depend largely upon hard work, ability to manage, open-mindedness, searching ability and enthusiasm. Address Box 529, THE RUBBER AGE.

RUBBER CHEMIST: With general experience as assistant to chief. Well established midwest factory. State positions held, age, whether married. Salary expected. Address Box 531, THE RUBBER AGE.

FOR SALE

HAVE a modern and fully equipped rubber dipped goods plant will sell outright or take stock in same; will also consider a merger. Building of fireproof construction and practically new. Address Box 528, THE RUBBER AGE.

FOR SALE—ABSTRACTS

CARD ABSTRACTS covering every important paper, publication and patent on Rubber and allied gums from 1907 to date. Arranged alphabetically by subjects with complete cross references. 40,000 cards in 24 Y & E oak cases. Address Box 515, THE RUBBER AGE.

MISCELLANEOUS

WANTED MANUFACTURING PLANT
A CORPORATION desires to purchase a manufacturing plant that is now manufacturing tires or molded mechanical goods; give full particulars in first letter. Address Box 530, THE RUBBER AGE.

FLUXRITE

PRACTICAL SOFTENERS

INVESTIGATIONS INVITED

You Cannot Afford to Be Without Them

DAMASCUS MANUFACTURING CORP.

CLEVELAND, OHIO

NEW JERSEY TERRITORY: H. M. Royal, Inc., Trenton

RUBBER DRYERS

The Hunter Process
in
The Carrier Ejector System Dryer

The successful drying of Rubber is essentially a problem of humidity control. The patented Hunter Process is used exclusively in Carrier Dryers. Carrier automatically controlled dryers reduce time, space and milling costs.

Write concerning your problem

Carrier Engineering Corporation
850 Frelinghuysen Ave. Newark, N. J.

For Rubber Compounding

C. K. WILLIAMS & CO. ANCHOR BRAND DRY COLORS AND FILLERS EASTON, PA. U.S.A.

IRON OXIDES

Asbestine
Barytes
Soapstone
Talc

C. K. WILLIAMS & CO.
EASTON, PA.

SINCE 1880 GUARANTEED

Rand RUBBER GOODS

Dress Shields
Rubber Sheetings
Bunny Baby Pants
Sanitary Requisites
Guimps & Brassieres
Randprint Aprons
All Styles Rubber Aprons
Pure Rubber Sheets
Rubber Bibs
Crib Sheets
Bathing Caps
Rubber Specialties
Powder Puff Pockets
Randprint Rubber
SHEET GUM cut to pattern for manufacturers

"They Last Longer"

Made by
RAND RUBBER COMPANY, Inc.
Formerly Brooklyn Shield & Rubber Co., BROOKLYN, N. Y.

SCOTT TESTERS

Simple enough to be practical. Free from complications and adjustments. Substantial and durable. As well as accurate, easy to read and easy to operate, Scott Testing Machines meet commercial requirements and conditions without sacrificing scientific exactness.

HENRY L. SCOTT COMPANY
PROVIDENCE, R.I.

The CARTER BELL MFG CO

CARTER BELL STANDARD SINCE 1903 RUBBER SUBSTITUTES

150 Nassau Street New York

Try Albert First

QUALITY
USED
MACHINERY
and
EQUIPMENT

L. ALBERT & SON
TRENTON, N. J. AKRON, OHIO

LATE MARKET PRICES

Crude, Scrap & Reclaimed Rubber - Cottons and Fabrics

NEW YORK, AUGUST 6, 1929

COTTON

THE advance in cotton prices during the middle of July failed to hold, and the spot quotation for middling upland cotton declined from 19.45 cents a pound on July 20 to 18.95 cents a pound on August 6. The low prices at the beginning and end of the month held the average for July down to 18.62 cents, as compared with the June average price of 18.74 cents and the July, 1928, average of 21.36 cents a pound.

While earlier estimates of this year's crop yield had varied over the unusually wide range between 15,000,000 and 17,000,000 bales, current opinion seems to be tending much more closely toward the lower figure. On August 6, the Garside Service put the crop at 15,080,000 bales and the Cochran Bureau estimated it at 15,022,000 bales.

No wide fluctuations in price are expected before the government report which has been scheduled for release on August 8.

High, low and closing prices quoted on August 6 were as follows:

	High	Low	Close August 6	Close July 20
Aug.	——	——	18.64	——
Sept.	——	——	18.80	19.31
Oct.	19.06	18.94	19.00	19.45

Tire Fabrics

There was a slight improvement in tire fabrics during the second week of the fortnight as compared with the first week, but still no exceptional poundages were reported called for. At the end of the period the market was quiet, with prices steady and with little inquiry current. It is estimated that close to 195,000,000 pounds of cotton fabric have been used in the tire industry during the first seven months of 1929, setting a new high mark in consumption. Latest price quotations were as follows:

CORD					
Peeler, carded, 23/5/3	lb	.47	@	.48
Peeler, carded, 23/4/3	lb	.48	@	.49
Peeler, carded, 13/3/3	lb	.44½	@	.45½
Peeler, carded, 15/3/3	lb	.45	@	.46
Egyptian, carded, 23/5/3	lb	.53½	@	.54
Egyptian, combed, 23/5/3	lb.	.57½	@	.58
CHAFERS					
Carded, American, 8 oz.	lb	.40	@	.41
Carded, American, 10 oz.	lb	.40½	@	.41½
Carded, American, 12 oz.	lb	.40½	@	.42½
Carded, American, 14 oz.	lb	.39	@	.45
LENO BREAKER					
Carded, American, 8¼ oz.	lb.	.40	@	.46
Carded, American, 10¼ oz.	lb.	.40	@	.46
SQUARE WOVEN					
Carded, American, 17¼ oz. 23-11 ply	lb.	.47	@	.48
Carded, American, 17¼ oz. 10-ply	lb	.39	@	.40

Sheetings

Sheetings have been inactive during the fortnight with prices at lower levels on practically all sizes. Late quotations furnished by the Textile Brokers Association were:

40-inch, 2.50-yard	yd.	—	@	.12½
40-inch, 2.85-yard	yd.	—	@	.11
40-inch, 3.15-yard	yd.		@	.11
40-inch, 3.60-yard	yd.	—	@	.09½
40-inch, 3.75-yard	yd.	.08⅝	@	.08⅞
40-inch, 4.25-yard	yd.	—	@	.07½

Ducks

Cotton ducks have been steady during the fortnight with the exception of belting and hose grades, which declined in price from a cent and a half to two cents a pound. A fair amount of business was reported from several quarters during the two weeks, although sales of numbered ducks continued rather light. Some demand has been evinced in the closing days for B grade single filling ducks at 14¼ cents upward. Latest price quotations were as follows:

Belting and Hose	lb.	.34	@	.35
Enameling	lb.	.35	@	.36
Single filling	lb.	.14½	@	.16
Double filling	lb.	—	@	.18

RECLAIMED RUBBER

With more than 140,000 tons of reclaimed rubber consumed by the domestic manufacturing industry in the first seven months of the year, there is a tendency for the demand for this commodity to slacken up slightly. Stocks on hand, however, are not considered too high for this time in the year, and there seems to be little reason for any appreciable cut in production schedules at reclaiming plants. Prices have changed but little during the past fortnight and were steady at the close of the period. The latest quotations on the different grades were as follows:

High Tensile				
Super-Reclaim No. 1 Black	lb.	.12¼	@	.12½
Super-Reclaim No. 2 Black	lb.	.11¾	@	.12
High Tensile Red	lb.	.12	@	.12¼
Shoe				
Unwashed	lb.	.07	@	.07¼
Washed	lb.	.09¾	@	.10
Tube				
No. 1 (Floating)	lb.	.13	@	.13½
No. 2 (compounded)	lb.	.10¼	@	10½
Tires				
Black	lb.	.07½	@	.07¾
Black, selected tires	lb.	.07¾	@	.08
Dark Gray	lb.	.10	@	.10¼
Light Gray	lb.	.12	@	.12¼
White	lb.	.12	@	.12½
Truck, Heavy Gravity	lb.	07	@	.07¼
Truck, Light Gravity	lb.	.07¼	@	.07½
Miscellaneous				
Mechanical Blends	lb.	.07	@	.07½
Red	lb.	.12	@	.12½

Scrap Rubber

With the prospects of a reduction of close to 20 per cent in reclaim consumption during the second half of 1929 as compared with the first half, dealers in scrap rubber have begun to find the demand for their commodity lessening. In addition, most reclaimers are believed to have fairly large stocks.

(Prices to Consumer)

Auto tire peelings	ton	42.50	@	45.00
Standard White auto	ton	47.50	@	50.00
Mixed auto	ton	26.50	@	27.50
Bicycle tires	ton	20.00	@	22.50
Clean solid truck tires	ton	24.00	@	25.00
Boots and shoes	cwt.	1.45	@	1.50
Arctics, untrimmed	lb.	.00⅞	@	.01
Inner tubes, No. 1	lb.	.08	@	.08¼
Inner tubes, No. 2, compounded	lb.	.04½	@	.04⅝
Inner Tubes, Red	lb.	.05¼	@	.05⅜
Air Brake Hose	ton	32.00	@	34.00
Rubber Hose	ton	17.50	@	20.00

CRUDE RUBBER

ALTHOUGH the crude rubber market has continued to be a dull affair, prices at the end of the present period closed a quarter of a cent or more a pound higher than those quoted on July 20. The high prices at the beginning of the month brought the average for July up to 21.30 cents a pound, which compares with 20.64 cents in June and 19.40 cents in July, 1928.

There has been a slight increase in the factory demand for spot rubber, but manufacturers are showing little interest in futures at present. It is believed, however, that they would buy liberally on any further setbacks from prevailing levels.

Actual rubber was reported as steady at the close of the period with holders offering sparingly. The relatively high cost of replacement is making for a reluctance on the part of sellers to make concessions. Shipment offerings were light and well above a workable basis.

Shipments from the East, while heavier in July than during June, were still well below the levels of the earlier months of the year. Stocks on hand in London and in Singapore and Penang were both around 30,000 tons at last reports, and it is not expected that stocks in this country will show much gain in the report to be issued as of July 31.

Contrary to the action of the plantation grades, Paras declined in price during the fortnight and closed a quarter of a cent below the July 20 quotations. Centrals and balata were unchanged and closed steady.

Price quoted on the New York outside market on August 6 were as follows:

Plantations—				
Ribbed Smoked Sheets—				
Spot		.20⅞	@	.21⅛
Aug.-Sept.		.21	@	.21⅛
Oct.-Dec.		.21⅛	@	.22⅛
First Latex, crepe spot		.21⅞	@	.22⅛
Amber Crepe, No. 2		.18⅛	@	.18⅝
Amber Crepe, No. 3		.17⅞	@	.18⅛
Amber Crepe, No. 4		.17⅝	@	.17⅞
Brown Crepe, Clean thin		.17⅞	@	.18⅛
Brown Crepe, specky		.17⅛	@	.17¾
Liquid Latex, per gal.		1.00		
Paras—				
Up-river Fine		.22	@	.22½
Up-river Medium		Nominal		
Up-river Coarse		.11½	@	.12
Acre Bolivian, fine		.22½	@	.22¾
Caucho Ball, Upper		.11½	@	.12
Islands, fine		Nominal		
Centrals—				
Central, scrap		.11½	@	.12
Esmeraldas		.11½	@	.12
Balata—				
Block, Colombia		Nominal		
Block, Ciudad		.54	@	

LONDON MARKET

Standard Ribbed Smoked Sheets—Buyers			
Spot	@	10⅞d	
Aug.-Sept.	10⅞d	@	11d

SINGAPORE MARKET

Standard Ribbed Smoked Sheets—Sellers			
Spot	@	10¼d	

H. MUEHLSTEIN & CO., Inc.

Crude - RUBBER - Scrap

41 East 42nd Street :: New York City

AKRON—1111 Akron Savings & Loan Bldg.
BOSTON—176 Federal Street.
CHICAGO—327 So. LaSalle Street.
LOS ANGELES—728 So. Hill Street.

WAREHOUSES—JERSEY CITY, N. J., and AKRON, OHIO

FACTICE GIVES

That Velvet Feel to Rubber

The STAMFORD RUBBER SUPPLY COMPANY
STAMFORD, CONN.

CLAYS FOR THE RUBBER TRADE

ALUMINITE

The Clay Supreme

UNITED CLAY MINES CORP.
TRENTON, N. J.

High Grade CLAYS of All Kinds

ALUMINUM FLAKE

Standard to the Rubber Industry for 20 Years

ALUMINUM FLAKE *has*

—Low specific gravity
—Extreme fineness
—Exceptional reinforcing and toughening qualities
—Absolute uniformity and purity

Write for information and samples to

THE ALUMINUM FLAKE CO.
AKRON OHIO

Agents

The American Oil and Supply Co. - Trenton, N. J.
Wm. H. Scheel and Co. - - - New York, N Y.
Schofield-Donald, Ltd. - Montreal, P. Q., Canada
The Kawanishi Exporting Co. - - Kobe, Japan
Typke and King - - - - - London, England

There is only one Aluminum Flake—We Make It!

"DURO" BRAND

GUAYULE RUBBER

Washed and dry, ready for compounding. Invaluable in conjunction with Plantation Rubbers and Reclaims as an aid in Compounding.
Especially useful in all Friction Stocks.

CONTINENTAL RUBBER CO., OF NEW YORK
1775 BROADWAY NEW YORK CITY

LATE RUBBER CHEMICAL PRICES

Accelerators — Colors — Softeners — Compounding Materials

NEW YORK, AUGUST 6, 1929

DESPITE the seasonal slackening up of production schedules in most tire and tube factories, the demand for rubber chemicals and compounding ingredients has not been appreciably affected. Other sections of the industry are still maintaining high rates of output, and some are increasing production during the summer months. Footwear factories are notably busy, as are plants manufacturing mechanical goods, waterproof materials, druggists' sundries and toys and novelties.

Price changes during the past fortnight have been few, the majority of chemical requisites being firm at levels that have prevailed for several months. Lower quotations were reported on some types of whites, but other colors continued to be steady. Makers of all the popular types of accelerators and anti-oxidants find little or no decrease in the market for their products.

ACCELERATORS

Organic			
A-7	lb.	.55 @	.59
A-11	lb.	.62 @	.66
A-16	lb.	.57 @	.61
A-19	lb.	.58 @	.62
A-20	lb.	.64 @	.68
Accelerator 102	lb.		
Accelerator 552	lb.		
Accelerator 808	lb.		
Accelerator 883	lb.		
Aero-X	lb.	.60 @	.65
Aldehyde ammonia, crystals	lb.	.65 @	.70
Aniline oil, drums, f.o.b. works	lb.	.15 @	.16½
Crylene	lb.	.55 @	.65
paste	lb.	.45 @	.55
Di-Ortho-Tolyguanidine	lb.	.42 @	.52
Diphenylguanidine	lb.	.30 @	.36
Ethylidene aniline	lb.	.45 @	.47½
Formaldehyde aniline	lb.	.34 @	.44
Heptene	lb.	.40 @	—
Hexamethylene-tetramine	lb.	.62½@	.65
Lithex	lb.	.18 @	.20
Methylenedianiline	lb.	.35 @	.45
Monex	lb.	3.25 @	—
Oxynone	lb.	.68 @	.80
Para-Nitrosodimethylaniline, f.o.b. works	lb.	.92 @	.96
Piperidine-Piperidyldithio-Carbamate	lb.	4.45 @	4.60
R & H 40	lb.	.40 @	.42½
R & H 50	lb.	.40 @	.42½
R & H 397	lb.	.75 @	.77½
Safex	lb.	1.20 @	1.25
Tensilac, No. 39	lb.	.50 @	.52½
Tensilac, No. 41	lb.	.50 @	.52½
Thermio F	lb.	.50 @	.55
Thiocarbanilide, drums	lb.	.26½@	.28½
Thionex	lb.		
Trimene	lb.	.75 @	—
base	lb.	1.20 @	—
Triphenylguanidine	lb.	.58 @	.62½
Ureka	lb.	.75 @	1.00
Vulcanex	lb.		
Vulcone	lb.		
Vulcanol	lb.		
Waxene	lb.	.30 @	.32
Z 88	lb.	.50 @	.60
Inorganic			
Lead, sublimed blue	lb.	.08¼@	—
Lead, white	lb.	.10½@	.12½
Litharge, domestic	lb.	.09 @	—
Magnesia, calcined,			
light	per 100 lb.	5.35 @	5.45
heavy	per 100 lb.	3.65 @	3.75

COLORS

Blacks (See Compounding Materials)			
Blues			
Prussian	lb.	.35 @	.40
Ultramarine	lb.	.06 @	.30
Browns			
Sienna, Italian	lb.	.05½@	.12½
Umber, Turkey	lb.	.04½@	.07
Greens			
Chrome, light	lb.	.27 @	.31
medium	lb.	.28 @	.31
dark	lb.	.31 @	.34
Chromium Oxide, bbl.	lb.	.31 @	.38
Reds			
Antimony			
crimson, 15/17	lb.	.44 @	.50
sulfur free	lb.	.52 @	.60
golden 15/17 F.S.	lb.	.20 @	.25
Indian English	lb.	.08 @	.12
Domestic (Maroon)	lb.	.08 @	.12
Oximony	lb.	.13¼@	—
Red oxide, pure	lb.	.10 @	.12
Venetian red	lb.	.03 @	.06
Vermillion, quicksilver,			
English	lb.	1.95 @	—
Whites			
Lithopone, Akrolith	lb.	.05 3/5@	.06
Lithopone, Azolith	lb.	.05¼@	.05¾
Lithopone, Vanolith	lb.	.05¾@	—
Titanox, f.o.b. St. Louis	lb.	.08½@	.09
Titanium Calcium Pigment, f.o.b. St. Louis	lb.	.08 @	.08½
Zinc Oxide—American Process			
American Azo:			
ZZZ (lead free)	lb.	.06½@	.07
ZZ (leaded)	lb.	.06⅝@	.06⅞
Zinc Oxide—French Process			
White seal	lb.	.11⅞@	—
Green seal	lb.	.10⅞@	—
Red Seal		.09⅞@	—
Yellows			
Chrome	lb.	.16½@	.17
Ocher, French medium	lb.	.02 @	.03
domestic	lb.	.01⅝@	.02

COMPOUNDING MATERIALS

Aluminum Flake	ton	21.85 @	24.50
Ammonia carbonate	lb.	.10½@	.12
Asbestine	ton	14.75 @	18.00
Barium carbonate	lb.	.02¼@	.02½
Barium Dust	lb	.05 @	.06
Barytes southern off-color	ton	12.00 @	18.00
Western prime white	ton	23.00 @	—
imported	ton	27.00 @	36.00
Basofor	lb.	.04½@	—
Blacks			
Arrow "Aerfloted"	lb.	.08½@	.12½
Bone Black	lb.	.07 @	.08½
Carbon, compressed	lb.	.08½@	.12½
Carbon, uncompressed	lb.	.08 @	.12
Drop Black	lb.	.06 @	.10
Fumonex	lb.	.06 @	.09
Gastex	lb.	.04½@	.08
Lamp Black	lb.	.12 @	.40
Micronex	lb.	.09 @	.13
Velvetex carbon	lb.	.04½@	.06
Blanc fixe dry f.o.b. works	lb.	.03½@	.03⅝
Carrara filler	lb.	.01⅝@	.02
Catalpo (fact.)	lb.	.02 @	—
Clay, China, domestic	ton	8.00 @	9.00
Aerfloted Suprex	ton	10.00 @	22.00
Congaree, c. l.			
f.o.b. mine	ton	9.00 @	—
Lexington	ton	10.00 @	22.00
Mineral Flour,			
c. l. fob mine	ton	20.00 @	23.00
Tensulite		15.00 @	—
Glues, extra white	lb.	.22 @	.26
medium white	lb.	.20 @	.24
Magnesia, carbonate	lb.	.07 @	.09
Mica (muscovite) 160 mesh			
White, water grnd., c.l.	lb.	.06 @	—
White, water grnd., ton lots, whse.	lb.	.07 @	—
White, water grnd., less ton lots, whse.	lb.	.08 @	—
Off color (biotite)	lb.	.05 @	.07
Rotten Stone (powdered)	lb.	.02½@	.04½
Soapstone, powdered	ton	15.00 @	22.00
Starch, powdered	cwt.	3.30 @	3.70
Talc, domestic	ton	12.00 @	15.00
Whiting, commercial	cwt.	.85 @	1.00
English cliffstone	cwt.	1.75 @	2.00
Superfine	ton	10.00 @	12.00
Witco	ton	12.00 @	—
Wood pulp XXX	ton	45.00 @	—
Wood pulp X	ton	25.00 @	—
Zinc Carbonate	lb.	.09½@	.10½
Zinc Stearate	lb.	.24 @	.25

MINERAL RUBBER

Genasco (factory)	ton	50.00 @	52.00
Montezuma, solid	ton	28.00 @	36.00
Montezuma, granulated	ton	32.00 @	42.00
Paradura	ton	62.50 @	65.00
Pioneer, MR, solid	ton	42.00 @	45.00
Pioneer-granulated	ton	52.00 @	55.00
R & H Hydro-Carbon	ton	27.05 @	29.00
Robertson, MR, solid	ton	34.00 @	80.00
M.R. (gran)	ton	38.00 @	80.00

SOFTENERS

Acids			
Nitric, 36 degrees	cwt.	5.00 @	5.25
Sulfuric, 60 degrees	ton	10.50 @	11.50
66 degrees	ton	15.00 @	16.00
Tartaric, crystals	lb.	.37 @	.38
Acids, Fatty			
Stearex	lb.	.15½@	.20
Stearic, double pressed	lb.	.17 @	.22
Alkalies			
Caustic soda, 76%	cwt.	3.76 @	3.91
Soda ash, 58% C.L.	cwt.	1.40 @	
Oils			
Corn, refined, bbls.	lb.	.11 @	.11½
Cottonseed, crude		.08½@	.08¾
Cycline	gal.	.27 @	.34
Degras (c.l. 100 bbls.)	lb.	.03¾@	—
Less c. l. (10-25 bbls.)	lb.	.04 @	—
Lots less than 10 bbls.	lb.	.04¼@	.04½
Fluxrite	lb.	.05 @	.06
Hexalin	lb.	.60 @	—
Acetate	lb.	.70 @	—
Linseed, Raw C.L. bbl.	lb.	.09½@	.10
Palm Lagos	lb.	.07¼@	.07½
Niger	lb.	.07¾@	.08
Vansulol	lb.	.10½@	—
Para-Flux	gal.	.17 @	—
Petrolatum, white	lb.	.08 @	.08½
dark amber	lb.	.03¾@	.03¾
Pine, steam distilled	gal.	.65 @	.70
Witco Softener (f.o.b. works)	lb	.02 @	—
Resins and Pitches			
Pitch, Burgundy	lb.	.06½@	.07½
coal tar	gal.	.05½@	.06
pine, 200 lb. gr. wt.	bbl.	9.00 @	10.00
Rosin, grade K, 280 lb.	bbl.	8.55 @	—
Pigmentar	gal.	.33 @	.41
Solvenol, drums	gal.	.48 @	.50
Tarol, drums	gal.	.30 @	.35
Tar Retort, 50 gal.	bbl.	12.50 @	13.00
Solvents			
Acetone, pure	lb.	.13 @	
Alcohol denatured,			
No. 1 bbls.	gal.	.37½@	.44½
Benzol, 90%	gal.	.28 @	—
Carbon bisulphide	lb.	.05½@	.06¼
Carbon tetrachloride	lb.	.06¼@	.07
Motor gasoline,			
steel bbls.	gal.	.17 @	—
Naptha, solvent	gal.	.35 @	.40
Turpentine, spirits	gal.	.60 @	.64
wood	gal.	.50 @	.54
Waxes			
Beeswax	lb.	.56 @	.58
Carnauba	lb.	.33 @	—
Ceresin, white	lb.	.10 @	.11
Montan, crude	lb.	.07 @	.07½
Ozokerite, black	lb.	.24 @	.25
green	lb.	.26 @	.30
Paraffin (c. l.—f.o.b. N. Y.)			
Yellow crude scale	lb.	.03¾@	
White crude scale 124/126	lb	.04 @	
Refined, 125/127	lb.	.05¾@	
Refined, 128/130	lb.	.05½@	
Refined, 135/137	lb.	.07¾@	
Refined, 138/140	lb.	.08¼@	
Miscellaneous			
RSL Mold Solution	gal.	.75 @	1.00

ANTI-OXIDANTS

Albasan	lb.	.70 @	.75
Antox	lb.		
Neozone	lb.		
Oxynone	lb.	.68 @	.80
Resistox	lb.	.54 @	.57
Stabilite	lb.	.64 @	—
VGB	lb.	.55 @	.66

SUBSTITUTES

Black	lb.	.08 @	.14
White	lb.	.10 @	.16
Brown	lb.	.08 @	.15

VULCANIZING INGREDIENTS

Sulfur Chloride (drums)	lb.	.03¼@	.03½
Sulfur flour,			
Refined, 100% pure (bags)	cwt.	2.40 @	2.75
Commercial (bags)	cwt.	1.75 @	2.10

TIRES & TUBES
CRUDE RUBBER

STATISTICAL SECTION

AUTOMOBILES
GASOLINE

HOW much of a decline July consumption of crude rubber in the United States will show from the previous month is now the leading question in the minds of all associated with the industry. Estimates from authorities in the trade vary from 36,000 tons to 40,000 tons, with the majority agreeing on a figure midway between the two extremes.

Automobile production has been continuing steadily, with a total of 3,411,451 cars and trucks turned out in the United States and Canada during the first six months of the year. Manufacturers are now introducing new models, resulting in a check on the slackening up that seemed imminent a few months ago. There is a possibility of two new manufacturers entering the American field with fairly large production schedules—one with a small British type car and the other with a "baby" car to retail at about $200.

The Bureau of Mines figure for the domestic demand for gasoline during June was not quite as high as had been expected. At 33,693,000 barrels, however, it exceeded any previous month on record with the exception of May of this year. July gasoline consumption figures will probably show a new high record when released.

Price averages for the month of July were higher for rubber and a trifle lower for cotton. On the New York outside market, the average spot price for rubber was 21.30 cents a pound as against 20.64 cents in June and 19.40 cents in July, 1928.

Latest figures covering imports and exports are in the following tables.

PLAN OF THE SECTION

The statistics included in this section have been chosen for their constant importance to the rubber industry. The tables are reprinted in the same relative position in every issue, each table being kept current by the addition of new figures as soon as they become available. The section accordingly affords the most up-to-date, complete and convenient statistical service in the industry.

Table of Contents

United States Rubber Imports and Exports
Rubber Consumption in the United States
Rubber Invoiced to the United States
Daily Rubber Prices in New York
Monthly and Annual Rubber Prices
London Official Rubber Prices
Daily Cotton Prices in New York
Stocks of Crude Rubber in the U. S.
Stocks of Crude Rubber in London
Rubber in Singapore and Penang
United States Tire and Tube Statistics
Automobile Production—U. S. and Canada
Rims Inspected and Passed in the U. S.
United States Consumption of Gasoline
Rubber Exports from Producing Countries
Rubber Imports into Consuming Countries

U. S. Imports and Exports of Crude Rubber

YEARS	Gross Imports: Long Tons	Gross Imports: Total Declared Value	Gross Imports: Average Declared Value per pound Cents	Re-exports: Long Tons	Re-exports: Total Declared Value	Re-exports: Average Declared Value per pound Cents	Net Imports: Long Tons
1921	185,394	73,772,677	17.76	5,716	2,414,924	18.86	179,678
1922	301,076	101,843,188	15.10	4,809	1,921,828	17.84	296,267
1923	309,144	185,060,304	26.72	8,772	5,672,319	28.87	300,372
1924	328,056	174,231,331	23.71	10,309	6,057,637	26.23	317,747
1925	396,642	429,705,014	48.36	14,827	19,847,753	59.76	381,815
1926	413,338	505,817,807	54.63	17,671	22,470,583	56.77	395,667
1927	426,258	339,874,774	35.60	27,775	24,735,488	39.76	398,483
1928	439,731	244,854,973	25.03	32,159	18,128,361	25.17	407,572
1926:							
July	35,820	33,061,281	41.20	1,554	1,743,854	50.09	34,266
Aug.	27,400	24,670,752	40.21	1,318	1,339,563	45.38	26,082
Sept.	37,112	32,625,032	39.25	1,437	1,519,870	47.20	35,675
Oct.	29,746	25,320,558	38.49	1,366	1,316,270	43.03	28,110
Nov.	39,155	34,890,536	39.78	1,482	1,411,517	42.51	37,673
Dec.	37,754	33,261,366	39.33	1,904	1,841,305	43.16	35,850
1927:							
Jan.	43,340	36,753,719	37.86	1,525	1,444,734	42.28	41,815
Feb.	28,337	23,110,257	36.41	2,451	2,277,297	41.47	25,886
Mar.	35,515	28,693,016	36.07	2,763	3,249,665	52.50	32,752
Apr.	46,202	37,321,505	36.06	1,575	1,428,425	40.48	44,627
May	36,518	30,984,377	37.88	2,782	2,501,562	40.14	33,736
June	33,045	27,850,014	37.62	1,775	1,550,592	39.00	31,270
July	37,677	31,678,259	37.53	1,958	1,560,853	35.59	35,719
Aug.	32,810	26,396,931	75.92	1,809	1,382,768	34.12	31,001
Sept.	33,301	25,314,412	33.94	3,500	3,036,929	38.74	29,801
Oct.	30,184	22,163,282	32.78	2,513	2,042,713	36.29	27,671
Nov.	28,592	27,395,428	31.69	2,469	2,014,196	36.43	36,123
Dec.	30,737	22,213,574	32.26	2,655	2,245,754	37.77	28,082
1928:							
Jan.	39,107	30,278,444	34.56	1,988	1,734,990	38.95	37,119
Feb.	33,663	27,763,655	36.82	2,738	2,229,589	36.35	30,925
Mar.	40,611	32,103,042	35.29	3,718	2,587,435	31.07	36,893
Apr.	37,935	27,287,266	32.11	2,272	1,415,024	27.80	35,663
May	31,059	19,058,672	27.39	2,399	1,386,307	25.80	28,660
June	27,765	14,121,219	22.71	2,621	1,400,697	23.86	25,144
July	31,258	14,144,765	20.20	3,087	1,451,446	20.99	28,171
Aug.	31,204	12,860,150	18.39	2,377	1,084,646	20.37	28,827
Sept.	39,235	16,512,019	18.50	3,038	1,384,148	20.34	36,797
Oct.	44,058	18,200,332	18.44	2,405	1,085,407	20.15	41,653
Nov.	36,519	14,878,441	18.19	2,788	1,207,089	18.52	33,731
Dec.	43,511	17,580,966	18.04	2,738	1,165,743	19.00	40,773
1929:							
Jan.	57,564	22,872,943	17.74	3,663	1,773,401	21.61	53,901
Feb.	64,265	24,760,111	17.20	2,955	1,374,783	20.77	61,310
Mar.	50,604	20,380,905	17.98	4,218	2,094,037	22.16	46,386
Apr.	55,725	25,542,726	20.46	3,293	1,624,237	22.02	52,432
May	51,161	24,355,511	21.25	2,386	1,349,690	21.24	48,325
June	41,663	18,799,307	20.14				

U. S. Consumption of Crude Rubber

(Rubber Manufacturers' Association statistics raised to 100 per cent—All figures in long tons)

Figures on Monthly Basis

	1922	1923	1924	1925	1926	1927	1928	1929
Jan.	16,938	30,106	29,058	29,638	32,196	31,518	34,403	45,002
Feb.	14,767	30,149	25,736	19,761	31,136	30,137	33,702	41,594
Mar.	21,408	36,629	28,385	33,498	32,936	36,141	35,688	44,730
Apr.	19,294	29,085	27,129	34,139	32,696	35,871	32,772	47,521
May	23,246	36,155	25,845	35,322	29,364	34,592	37,333	49,233
June	31,713	24,272	22,753	35,822	28,598	33,801	37,676	43,227
July	24,522	17,685	23,396	36,053	27,577	29,219	37,407	
Aug.	29,631	20,359	28,982	35,909	34,533	33,460	42,927	
Sept.	24,410	17,594	31,497	31,691	32,904	27,214	39,882	
Oct.	26,881	21,321	31,520	29,047	29,836	26,790	40,857	
Nov.	24,950	20,437	27,289	28,853	28,080	26,792	37,461	
Dec.	25,070	31,902	27,199	28,748	26,293	25,492	31,232	
Totals	282,560	305,694	328,769	388,481	366,149	371,027	441,340	

Figures on Quarterly Basis

Quarter	1922	1923	1924	1925	1926	1927	1928	1929
Jan./Mar.		96,776	87,609	95,263	94,301	99,216	103,558	128,565
Apr./June	127,360	89,493	75,674	104,099	87,109	103,242	103,500	
July/Sept.		55,621	83,813	99,493	93,793	89,210	117,573	
Oct./Dec.	155,067	63,617	92,656	85,789	83,212	80,860	117,597	
Totals	282,427	305,507	339,752	384,644	358,415	372,528	442,227	128,565

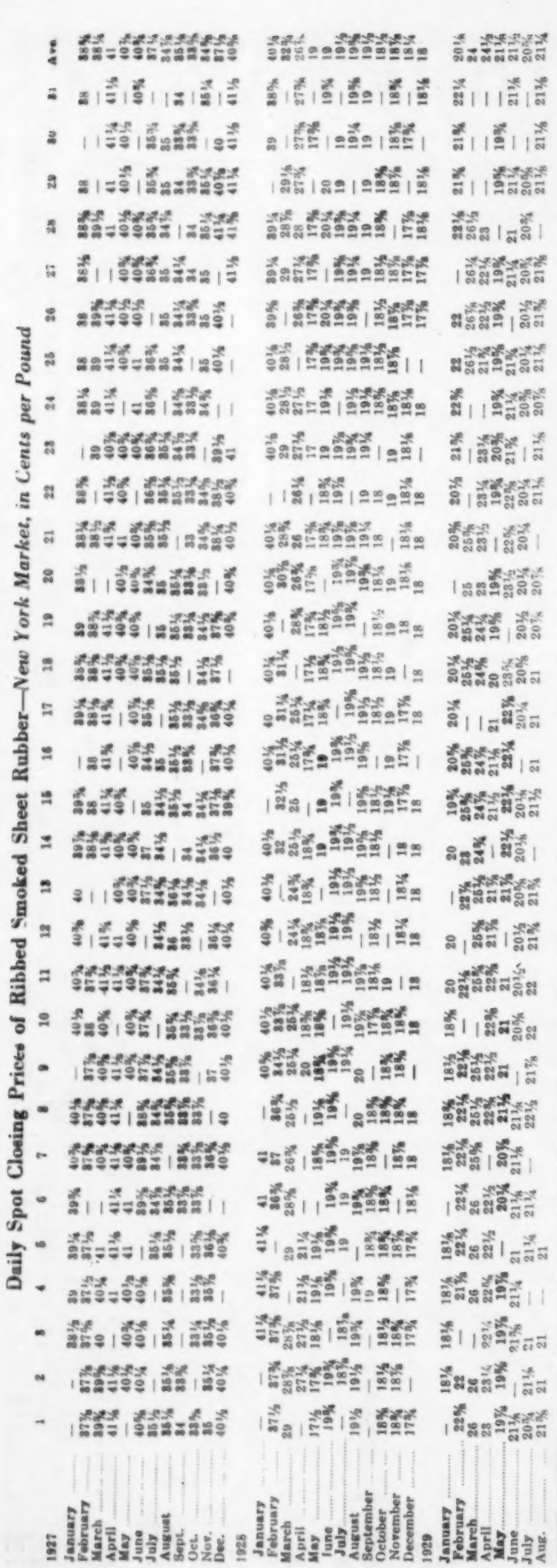
Note—The Rubber Association estimates its monthly rubber consumption figures to be 90 per cent complete. Up until 1925 the quarterly figures were likewise estimated to be 90 per cent complete; beginning with 1925 an estimate of 92 per cent completeness has been used. These estimates have been used in raising the figures in this table to 100 per cent. The quarterly figures are generally regarded as the most authentic; the monthly figures may be accepted as preliminary.

Rubber Invoiced to the U. S.

(Reported by American Consuls—Quantities in Long Tons)

During the Week Ended	From Br. Malaya	From Ceylon	From Dutch East Indies	From London & Liverpool	Total
May 4	6,573	888	2,374	166	10,001
May 11	6,798	852	1,148	213	9,011
May 18	8,026	1,011	2,028	126	11,191
May 25	7,020,	558	2,070	115	9,763
June 1	6,024	759	2,044	45	8,872
June 8	6,117	1,102	1,808	68	9,095
June 15	6,812	983	1,521	99	9,415
June 22	6,393	802	1,555	132	8,882
June 29	6,103	1,416	1,946	73	9,538
July 6	6,123	358	1,909	86	8,476
July 13	6,648	927	1,708	7	9,290
July 20	5,107	839	1,313	56	7,315
July 27	6,649	432	1,988	75	9,144

Daily Spot Closing Prices of Ribbed Smoked Sheet Rubber—*New York Market, in Cents per Pound*



Average Spot Closing Prices—Ribbed Smoked Sheets

(New York Market)

Average Price per Pound for Years 1910-1921

Year	Cents	Year	Cents	Year	Cents
1910	206.60	1914	65.33	1918	60.15
1911	141.30	1915	65.85	1919	48.70
1912	121.60	1916	72.50	1920	36.30
1913	82.04	1917	72.23	1921	16.36

Average Monthly Price per Pound Since 1922

Months	1922 Cents	1923 Cents	1924 Cents	1925 Cents	1926 Cents	1927 Cents	1928 Cents	1929 Cents
Jan.	18.32	32.73	25.86	36.71	79.50	38.75	40.25	20.14
Feb.	16.12	35.14	25.29	36.01	62.25	38.25	32.75	23.97
Mar.	14.53	34.21	22.83	41.00	59.00	41.04	26.82	24.55
Apr.	15.99	32.48	22.51	43.64	51.25	40.86	18.97	21.13
May	15.25	27.39	18.89	58.47	47.75	40.76	18.99	21.46
June	15.11	26.88	18.81	77.26	42.50	37.25	19.59	20.64
July	14.67	26.10	22.16	103.16	41.03	34.87	19.40	21.30
Aug.	13.93	28.84	26.17	82.99	38.50	35.12	19.46	—
Sept.	14.44	28.95	27.56	88.88	41.00	33.67	18.47	—
Oct.	19.78	26.93	31.13	98.01	42.50	34.32	18.83	—
Nov.	23.88	27.14	34.33	104.80	38.50	37.58	18.26	—
Dec.	27.42	26.60	37.88	98.51	38.25	40.63	17.97	—
Average for Year	17.50	29.45	26.20	72.46	48.50	37.72	22.48	—

London Closing Prices of Ribbed Smoked Sheet

(In Pence Per Pound)

Day	May	June	July	Aug.	Day	May	June	July	Aug.
1	9 7/8	10 3/4	10 5/8	—	17	11 5/8	10 1/2	11	—
2	10	—	10 7/8	—	18	—	10 1/2	10 7/8	—
3	10	10 7/8	10 7/8	—	19	—	10 5/8	10 3/4	—
4	—	10 5/8	10 7/8	—	20	—	10 1/2	10 3/4	—
5	—	10 5/8	11	—	21	11 1/2	10 1/2	—	—
6	10 1/8	10 1/2	11 1/4	—	22	11 3/8	10 1/2	11	—
7	10 3/8	10 5/8	—	—	23	10 1/2	—	11	—
8	10 5/8	10 5/8	11 1/2	—	24	10 5/8	10 1/2	10 7/8	—
9	—	—	11 1/2	—	25	10 1/2	10 1/2	11	—
10	10 1/2	10 1/2	11 1/2	—	26	—	10 1/2	11 1/8	—
11	10 5/8	10 5/8	11 1/2	—	27	10 3/8	10 5/8	11 1/8	—
12	—	10 5/8	11 1/4	—	28	10 1/2	10 5/8	—	—
13	11	10 5/8	11 1/4	—	29	10 3/4	10 5/8	11	—
14	11 3/8	10 1/2	—	—	30	10 7/8	—	11	—
15	11 1/2	10 1/2	11 1/4	—	31	10 3/4	—	11	—
16	11 1/8	—	11	—					

Average Monthly Price Per Pound

Month	1927 Pence	1928 Pence	1929 Pence	Month	1927 Pence	1928 Pence	1929 Pence
Jan.	19.410	19.310	9.942	Aug.	17.202	9.300	—
Feb.	19.021	15.713	11.875	Sept.	16.293	8.580	—
Mar.	20.125	12.736	12.135	Oct.	16.366	8.807	—
Apr.	19.897	8.864	10.490	Nov.	18.159	8.596	—
May	19.769	8.845	10.717	Dec.	19.690	8.570	—
June	17.880	9.293	10.580	Average			
July	16.770	9.312	11.065	for Year	18.375	10.656	—

Spot Closing Cotton Prices

(Middling Upland Grade—New York Market)

Recent Daily Price Per Pound

Day of Month	July	Aug.	Day of Month	July	Aug.	Day of Month	July	Aug.
1	18.20	19.20	11	18.20	—	21	—	—
2	18.20	18.85	12	18.35	—	22	19.00	—
3	18.35	19.00	13	18.25	—	23	18.75	—
4	—	—	14	—	—	24	18.60	—
5	18.35	18.90	15	18.00	—	25	18.80	—
6	18.35	—	16	18.35	—	26	18.70	—
7	—	—	17	18.90	—	27	18.65	—
8	18.60	—	18	18.85	—	28	—	—
9	18.70	—	19	19.20	—	29	18.75	—
10	18.55	—	20	19.45	—	30	18.90	—
						31	19.20	—

Average Monthly Price Per Pound

Month	1927 Cents	1928 Cents	1929 Cents	Month	1927 Cents	1928 Cents	1929 Cents
Jan.	13.42	19.12	20.22	Aug.	20.04	19.28	—
Feb.	14.10	18.40	20.21	Sept.	21.95	18.67	—
Mar.	14.32	19.38	20.19	Oct.	20.22	19.62	—
Apr.	14.75	20.63	20.29	Nov.	20.22	19.84	—
May	16.07	21.58	19.41	Dec.	19.58	20.22	—
June	16.85	21.50	18.74	Average			
July	18.00	21.36	18.62	for Year	17.49	19.97	—

Stock of Crude Rubber in the U. S.

(All Quantities in Long Tons)

At	ON HAND			AFLOAT			ON HAND AND AFLOAT		
End of	1927	1928	1929	1927	1928	1929	1927	1928	1929
Jan.	76,172	110,244	76,342	45,312	41,256	78,596	121,484	151,500	154,938
Feb.	91,186	108,955	90,058	42,166	43,316	63,825	133,352	152,271	153,883
March	85,740	114,061	100,536	49,600	39,324	56,476	135,340	153,385	157,012
April	92,757	113,083	107,659	38,963	33,986	55,409	131,720	147,069	163,068
May	94,563	105,356	97,192	44,181	34,374	55,404	138,744	139,730	152,596
June	89,250	90,198	92,061	47,233	40,001	46,035	136,483	130,119	138,096
July	98,469	83,242		40,687	42,304		139,056	125,546	
Aug.	96,148	68,994		40,937	51,875		137,085	120,869	
Sept.	97,829	68,851		37,966	48,566		135,793	117,417	
Oct.	97,452	66,421		42,804	41,571		140,256	107,992	
Nov.	101,034	61,956		37,076	68,119		138,110	130,075	
Dec.	100,130	66,166		47,938	68,764		148,068	134,930	

(Rubber Manufacturers' Association figures raised to 100%.)

Stock of Crude Rubber in London

(No. of tons in Wharves and Warehouses, including Latex)

At end of:	1921	1922	1923	1924	1925	1926	1927	1928	1929
Jan.	56,573	67,252	73,498	57,460	27,172	9,994	54,994	66,524	25,191
Feb.	59,439	67,623	70,483	56,782	23,425	10,004	58,826	62,964	25,554
Mar.	63,913	66,670	63,438	55,647	18,104	13,127	63,055	58,272	28,214
Apr.	68,759	68,637	58,770	54,559	12,949	18,773	66,897	53,425	31,368
May	70,403	70,146	54,439	51,615	5,895	20,384	67,169	44,628	31,290
June	69,408	71,597	51,050	51,115	5,318	23,984	63,902	38,756	
July	71,065	71,515	49,937	52,073	4,258	27,727	63,717	35,429	
Aug.	73,211	72,112	58,427	49,700	4,619	30,165	64,491	32,084	
Sept.	72,175	70,977	54,523	44,011	5,453	35,077	68,236	31,440	
Oct.	69,229	68,536	58,891	37,523	5,086	42,138	69,569	24,207	
Nov.	70,786	68,548	60,074	33,593	3,869	44,057	67,050	17,775	
Dec.	69,792	72,299	60,246	29,488	5,697	48,918	63,793	19,815	

At End of Recent Weeks

	First Saturday	Second Saturday	Third Saturday	Fourth Saturday	Fifth Saturday
1928					
July	36,915	35,925	35,238	35,445	———
August	34,294	33,649	32,591	32,815	———
September	31,933	31,477	32,116	31,884	31,462
October	29,525	27,370	26,477	24,240	
November	22,919	21,494	20,194	18,724	———
December	16,855	16,517	17,669	18,821	19,727
1929					
January	21,953	23,016	23,547	24,423	———
February	25,389	25,413	24,757	25,005	———
March	25,441	25,920	26,442	27,656	28,077
April	28,934	30,446	30,503	31,213	
May	31,580	31,127	30,955	30,893	———
June	31,539	31,635	31,127	30,617	30,982
July	29,996	30,661			

Rubber in Singapore and Penang

(Stocks held by Dealers—Quantities in Long Tons)

End of	1927	1928	1929	End of	1927	1928	1929
Jan.	25,440	25,868	29,617	July	22,558	18,663	———
Feb.	26,766	22,867	32,373	Aug.	25,764	18,971	———
Mar.	27,844	20,538	29,437	Sept.	25,178	14,898	———
Apr.	24,543	16,946	26,474	Oct.	25,790	12,149	———
May	25,133	17,437	30,764	Nov.	28,369	29,188	———
June	21,898	18,207	30,403	Dec.	25,798	32,895	———

Rims Inspected and Passed in U. S.

(Tire and Rim Association Reports)

	Total	Per Cent Balloons		Total	Per Cent Balloons
1923	23,140,620	0.6	1926	24,199,524	78.8
1924	21,863,311	19.7	1927	19,700,003	79.1
1925	26,001,664	66.8	1928	24,247,282	81.6
1928			1929		
July	2,209,692	85.9	January	1,835,207	79.4
August	2,318,898	80.2	February	2,265,024	80.8
September	2,315,604	76.9	March	2,613,389	80.4
October	2,114,611	72.2	April	2,729,899	81.3
November	1,213,245	66.4	May	2,574,224	76.5
December	1,101,195	74.7	June	2,184,219	75.3

U. S. Consumption of Gasoline

(In Barrels of 42 Gallons)

MONTHS	1925	1926	1927	1928	1929
January	14,386,000	17,582,000	17,888,000	20,938,000	22,602,000
February	13,210,000	15,814,000	18,240,000	21,136,000	22,776,000
March	14,890,000	19,302,000	22,464,000	24,041,000	28,495,000
April	19,013,000	20,848,000	23,371,000	25,712,000	32,019,000
May	20,459,000	24,213,000	26,579,000	27,355,000	34,117,000
June	20,724,000	23,803,000	27,799,000	29,022,000	33,693,000
July	22,879,000	24,752,000	29,784,000	30,960,000	
August	22,323,000	26,912,000	29,779,000	33,148,000	
September	20,177,000	22,929,000	28,409,000	29,691,000	
October	19,826,000	23,973,000	25,497,000	30,610,000	
November	18,024,000	20,618,000	24,400,000	26,222,000	
December	17,954,000	21,419,000	23,718,000	26,644,000	
TOTAL	223,865,000	262,165,000	297,928,000	327,932,000	

U. S. Tire and Tube Statistics

(All Figures Represent Thousands)

AUTOMOBILE CASINGS

Figures for Recent Years

	1922	1923	1924	1925	1926	1927	1928
Production	40,932	45,259	51,633	60,845	61,237	64,439	77,944
Shipments	39,987	45,204	50,120	59,262	59,002	64,059	74,296
Inventory[2]	6,132	5,772	7,427	8,142	10,456	10,264	13,624

Figures for Recent Months

	PRODUCTION			SHIPMENTS			INVENTORY		
	1927	1928	1929	1927	1928	1929	1927	1928	1929
Jan.	4,965	5,358	6,722	4,932	5,394	6,626	10,432	9,949	13,712
Feb.	5,095	6,363	6,912	4,458	5,031	5,282	11,075	11,721	15,495
Mar.	6,276	6,819	7,519	5,701	5,731	6,708	11,363	12,389	16,851
Apr.	6,299	6,178	7,884	5,701	5,812	7,294	12,122	12,717	16,929
May	6,151	6,759	8,145	5,657	6,457	7,184	12,462	13,024	17,849
June	6,202	6,692		6,253	7,117		12,462	12,162	
July	5,087	6,498		5,973	7,895		11,326	11,157	
Aug.	5,752	7,469		6,393	8,403		10,721	10,084	
Sept.	4,822	6,802		5,717	7,145		9,722	9,765	
Oct.	4,773	7,326		4,799	5,717		9,665	11,520	
Nov.	4,502	6,075		4,306	4,998		10,136	12,579	
Dec.	4,497	5,605		4,165	4,591		10,264	13,624	

AUTOMOBILE INNER TUBES

Figures for Recent Years

	1922	1923	1924	1925	1926	1927	1928
Production	50,850	60,116	70,706	82,614	76,618	70,823	80,180
Shipments	49,673	59,072	68,016	81,004	71,591	72,896	77,127
Inventory[2]	7,643	8,425	11,052	11,313	16,200	13,692	16,117

Figures for Recent Months

	PRODUCTION			SHIPMENTS			INVENTORY		
	1927	1928	1929	1927	1928	1929	1927	1928	1929
Jan.	5,337	5,441	6,517	6,016	6,072	7,242	15,585	12,982	15,386
Feb.	5,658	6,895	6,769	5,120	5,431	5,278	16,075	14,650	16,999
Mar.	7,184	6,231	7,466	6,157	5,731	6,737	17,096	15,573	17,750
Apr.	7,373	6,661	7,634	6,359	5,702	7,164	17,801	16,638	18,134
May	6,737	7,168	7,660	6,140	6,300	7,038	18,389	17,702	18,928
June	6,306	6,953		6,832	7,136		17,858	17,159	
July	5,284	6,674		7,070	8,729		16,004	14,974	
Aug.	6,480	8,343		7,983	9,350		14,664	13,981	
Sept.	5,651	7,103		6,758	7,154		13,511	13,543	
Oct.	5,065	6,929		5,024	5,662		13,539	15,285	
Nov.	4,775	5,592		4,723	5,002		13,585	15,743	
Dec.	4,969	5,184		4,712	4,858		13,692	16,117	

(1) Rubber Manufacturers' Association figures, raised to 100%. The Association estimates its figures to be 75% representative or complete when issued and that basis has been accepted when preparing the statistics in this table.

(2) Held by manufacturers at end of period indicated.

Automobile Production

	United States			Canada			
	Total	Passenger Cars	Trucks	Total	Passenger Cars	Trucks	Grand Total
1922	2,547,208	2,302,923	244,285	102,053	94,904	7,149	2,649,261
1923	4,020,255	3,631,728	388,527	146,438	129,228	17,210	4,166,693
1924	3,600,918	3,203,049	397,869	135,246	117,765	17,481	3,736,164
1925	4,265,704	3,760,459	505,245	161,389	139,311	22,078	4,427,093
1926	4,298,799	3,808,753	490,046	205,092	164,483	40,609	4,503,891
1927							
July	268,474	236,866	31,608	10,987	8,719	2,268	279,461
Aug.	308,807	274,378	34,429	12,526	10,139	2,387	321,333
Sept.	260,420	226,440	33,980	11,262	8,681	2,581	271,682
Oct.	219,712	183,041	36,671	7,791	6,236	1,555	227,503
Nov.	134,381	109,742	24,639	6,617	5,173	1,444	140,998
Dec.	133,178	105,784	27,394	3,435	2,277	1,158	136,613
TOTAL	3,393,887	2,938,868	453,019	179,426	146,870	32,556	3,573,313
1928							
Jan.	225,039	199,032	26,007	8,463	6,705	1,758	233,502
Feb.	323,368	290,830	32,358	12,504	10,315	2,189	335,872
March	412,825	371,408	41,417	9,724	7,478	2,246	422,549
April	409,948	364,877	45,071	24,240	20,546	3,694	434,188
May	425,990	375,798	50,192	33,942	29,764	4,178	459,932
June	396,967	356,439	40,528	28,399	25,341	3,058	425,366
July	390,445	237,933	52,512	25,226	20,122	5,104	415,671
Aug.	458,429	400,689	57,740	31,245	24,274	6,971	489,674
Sept.	413,722	358,872	54,850	21,193	16,572	4,621	434,915
Oct.	397,096	339,976	57,120	18,536	13,016	5,520	415,632
Nov.	256,936	217,256	39,680	11,769	8,154	3,615	268,705
Dec.	233,135	205,144	27,991	9,425	6,734	2,691	242,560
TOTAL	4,357,384	3,826,613	530,771	242,382	196,737	45,645	4,599,944
1929							
Jan.	402,154	350,617	51,537	21,501	17,164	4,337	423,655
Feb.	466,084	407,589	58,495	31,287	28,486	2,801	497,371
March	584,733	513,266	69,559	40,621	32,833	7,788	625,354
April	620,656	538,679	81,977	41,901	34,392	7,509	662,557
May	603,969	516,055	86,596	31,559	25,129	6,430	635,528
June	545,252	453,956	91,296	21,492	16,511	4,981	566,744

Exports of Crude Rubber from Principal Producing Countries

(*Long Tons*)

	BRITISH MALAYA[1]							DUTCH EAST INDIES[4]						
	Gross Exports	Imports	Gross Exports Minus Imports	Ceylon[2]	India & Burma[3]	Sarawak[4]	British North Borneo[3]	Siam[4]	Java & Madura	Sumatra E. Coast	Other D.E.I.	Indo-China[5]	Amazon Valley	All Other[6]	World Total[7]
1923	252,016	70,432	181,584	39,971	6,416	5,705	4,237	1,718	32,930	46,344	57,822	5,067	16,765	7,856	406,955
1924	259,706	108,524	151,182	39,997	7,697	6,699	4,621	2,962	42,446	54,497	80,347	6,688	23,165	9,065	429,366
1925	316,825	158,022	158,803	49,566	10,082	5,424	5,377	5,377	46,757	65,499	120,626	7,881	25,298	13,797	517,523
1926	391,328	151,243	240,085	58,962	9,874	9,155	6,079	4,027	52,186	71,413	121,231	8,203	24,298	16,017	621,530
1927	371,322	182,845	188,477	55,356	11,321	10,923	6,582	5,472	55,297	77,815	142,171	8,645	28,782	15,633	606,474
1928	409,430	149,787	259,643	57,267	10,790	10,087	6,698	4,813	58,848	82,511	121,770	9,548	21,129	10,690	653,794
1927:															
July	23,947	12,697	11,250	4,018	827	859	544	333	4,771	6,142	11,566	519	1,757	1,113	43,699
Aug.	30,371	17,105	13,266	5,357	688	1,133	623	546	4,855	6,682	12,440	716	1,928	969	48,703
Sept.	29,835	12,095	17,740	4,911	479	645	566	498	3,635	5,957	9,853	497	2,072	1,213	48,066
Oct.	29,546	15,801	14,045	5,245	802	721	591	542	3,810	7,755	13,638	775	2,752	939	51,520
Nov.	28,277	19,860	8,417	4,464	1,277	1,241	591	600	4,127	6,587	14,395	683	2,369	1,627	46,378
Dec.	32,185	17,865	14,320	4,130	1,395	946	592	664	5,763	7,878	13,438	1,191	3,340	1,444	55,101
1928:															
Jan.	27,789	16,618	11,171	3,830	1,605	842	581	525	4,851	7,988	11,774	1,100	2,273	1,025	47,565
Feb.	28,848	12,911	15,937	4,947	1,081	667	581	536	4,052	6,757	8,630	787	1,612	1,276	46,860
Mar.	27,879	10,508	17,371	3,683	775	645	581	269	3,999	5,825	9,690	700	2,750	1,211	47,499
Apr.	20,139	9,335	10,804	3,233	789	630	494	258	3,993	5,040	5,499	736	1,014	1,323	33,810
May	26,483	10,350	16,133	3,091	654	842	494	241	4,943	5,355	10,347	717	2,602	1,135	45,994
June	22,994	16,168	6,826	3,107	963	926	494	451	5,419	5,863	13,655	725	1,399	960	40,788
July	30,481	13,383	17,098	5,129	1,043	905	593	366	5,602	7,565	11,594	698	1,264	873	52,731
Aug.	35,674	15,114	20,560	5,720	398	1,227	593	544	5,668	7,438	11,893	712	1,732	450	56,936
Sept.	29,769	11,239	18,530	4,675	457	938	594	447	4,956	6,536	9,863	969	1,614	494	50,073
Oct.	24,476	12,603	11,873	3,999	864	949	564	457	5,295	7,474	10,124	513	1,399	732	44,243
Nov.	68,135	10,436	57,699	8,005	1,048	772	564	425	4,950	7,902	7,805	943	1,790	623	92,526
Dec.	66,763	11,122	55,641	7,848	1,113	744	565	294	5,120	8,792	10,896	948	2,220	588	94,769
1929:															
Jan.	52,546	13,415	39,131	8,301	1,664	873	500*	461	5,640	8,067	11,076	395	2,134	642	78,884*
Feb.	47,926	12,103	35,823	6,943	1,117	955	500*	495	6,572	7,511	10,384	965	2,104	520	73,889*
Mar.	49,448	14,553	34,895	6,713	1,413	758	500*	499	5,515	6,620	10,629	741	2,332	786	71,401*
Apr.	49,816	11,414	38,402	4,676	727	747	500*	306	5,997	6,645	11,321	568	1,950		
May	43,960	15,593	28,367	4,850	800	966	500*	453	6,264	6,961	13,437	650	1,922		
June	40,398	14,344	26,054	6,051		1,061	500*	422	5,582	6,693	11,270	608	1,398		
July	46,454	15,071	31,383	5,746								555			

(1) Malayan net exports cannot be taken as production, since imported rubber is largely wet native rubber, which is reduced about one-third in weight by remilling; rubber exported as latex is not included which on a basis of 3½ pounds per gallon amounted to 115 tons in 1923, 1,117 in 1924, 3,618 in 1925, 3,263 in 1926, 2,439 in 1927 and 1,437 in 1928. (2) Ceylon Chamber of Commerce statistics until 1926; rubber exported as latex is not included— such shipments were equivalent to 18 tons in 1923, 93 tons 1924, 6 tons 1925, 20 tons in 1926, about ½ ton in 1927, and 1 ton in 1928. (3) Official statistics. (4) Imports into Singapore and Penang. (5) Exports from "Other D.E.I." are chiefly wet native rubber, which is reduced about one-third in weight by remilling; rubber exported as latex is not included which on a basis of 3½ pounds per gallon amounted to 2,342 tons in 1923, 1,008 tons 1924, 2,239 tons 1925, 44 tons in 1926, 84 tons in 1927, and 1,459 tons in 1928. (6) Calculated from official import statistics of principal consuming countries, viz., United States, United Kingdom, France, Germany, Belgium and Netherlands. This figure includes guayule rubber. (7) This total includes the third column for British Malaya, "Gross Exports minus Imports," and all the figures shown for the other territories. *Figure is provisional; final figure will be shown immediately it becomes available.

Net Imports of Crude Rubber into Principal Manufacturing Countries

(*Long Tons*)

	United States*	United Kingdom	France (h)	Germany	Canada (ac)	Japan (da)	Italy	Russia (ce)	Australia (cd)	Belgium (d)	Netherlands	Scandinavia (abcdf)	Spain (g)	Czechoslovakia (abcd)	World Total
1919	236,977	42,671	17,685	5,584	6,395	9,758	9,894	75	1,002	3,995	2,771	3,149	2,418	9	342,378
1920	248,762	56,844	13,885	11,890	11,746	5,297	6,123	62	1,815	3,840	5,510	2,292	2,008	567	370,641
1921	179,678	42,087	15,135	21,920	8,124	21,713	3,906	165	1,014	1,705	1,022	1,279	2,245	569	300,562
1922	296,267	11,724	24,352	27,546	9,207	15,934	6,430	2,498	2,643	172	-3,807	1,778	589	567	395,885
1923	300,372	12,700	27,392	18,519	13,277	15,372	8,489	2,986	1,649	2,184	792	2,528	630	1,128	408,018
1924	317,747	-11,550	30,446	22,727	14,299	19,571	8,764	2,346	3,124	2,688	-807	3,178	944	1,370	414,847
1925	381,815	4,061	32,956	33,937	19,688	11,117	11,412	7,088	4,757	2,930	875	3,149	1,155	1,558	516,491
1926	395,667	84,865	34,240	22,775	20,229	18,125	9,809	6,529	9,021	2,498	2,670	4,046	1,299	1,870	613,649
1927	398,483	60,249	34,271	38,892	26,405	20,521	11,381	12,018	9,490	6,482	636	4,224	2,055	2,672	627,789
1928	404,496	4,846	36,498	37,855	30,447	25,621	12,433	15,134	8,430	7,958	2,243	4,418	3,178	3,138	596,695
1927:															
June	31,270	2,282	2,387	3,632	2,086	798	942	1,506	557	583	-17	243	164	183	46,616
July	35,719	1,116	2,384	2,899	2,104	1,505	1,007	415	900	429	66	227	177	236	49,184
August	31,001	3,463	2,795	3,119	2,013	1,970	1,274	386	650	604	-63	312	138	123	47,785
September	29,801	7,800	1,956	2,891	1,850	2,025	684	518	772	552	-33	451	155	272	49,694
October	27,671	5,888	3,479	4,202	1,790	1,966	1,021	1,075	908	465	156	401	153	363	49,538
November	36,123	1,687	3,661	4,209	1,916	1,575	1,167	1,312	836	749	298	474	246	317	54,570
December	28,082	309	4,696	3,108	2,302	2,710	1,462	1,453	1,242	784	-202	514	268	300	47,028
1928:															
Jan.	37,120	1,921	1,764	2,485	2,290	1,361	760	755	802	589	52	261	335	376	50,871
Feb.	30,926	3,143	2,526	2,984	2,553	1,248	437	783	616	599	98	307	296	297	46,813
Mar.	36,893	3,179	1,902	3,521	2,989	1,694	763	231	918	816	95	351	497	398	54,247
April	35,663	—2,280	2,204	2,719	1,938	2,334	1,114	1,820	832	575	280	339	304	159	48,001
May	28,660	—5,322	3,297	2,944	2,180	2,288	1,090	3,893	655	746	209	485	220	213	41,558
June	25,143	—3,031	3,597	2,968	2,186	2,102	984	4,111	348	743	133	346	251	182	40,063
July	28,170	—1,374	3,518	3,387	2,692	2,026	1,598	724	591	895	395	294	175	384	43,475
Aug.	28,827	48	3,527	2,744	2,447	1,868	875	632	707	519	316	359	58	94	43,021
Sept.	36,800	4,199	3,524	3,553	2,812	1,837	1,278	20	603	597	345	377	277	235	56,457
Oct.	41,667	—934	3,728	4,386	2,943	3,711	1,049	98	766	696	141	527	250	318	59,346
Nov.	33,846	—3,141	3,278	3,694	2,799	2,150	1,340	689	837	544	31	337	252	282	46,938
Dec.	40,781	8,488	3,633	2,470	2,618	3,002	1,145	1,378	755	639	148	435	263	200	65,905
1929:															
Jan.	53,922	11,961	5,645	4,711	3,759	3,776	1,481	956	1,061	749	218	638	179	525	89,571
Feb.	61,331	5,179	5,001	4,613	2,908	2,727	1,259	684	1,131	627	113	226	115	356	86,275
Mar.	46,391	9,068	4,409	4,586	4,961	2,630	1,515	716	725	931	316	354	80	409	77,091
Apr.	52,447	8,295	4,854	5,351	3,177	2,308	1,407	689	1,518	750	144	956	40	445	82,381
May	48,350	5,112	3,152	3,682	2,937	2,314			1,437	854	201				
June	38,676	5,361		3,948	3,075				2,215						

a—Including gutta percha. b—Including balata. c—Re-exports not deducted in monthly statistics. d—Including some scrap and reclaimed rubber. e—Official statistics of rubber imports by Soviet Russia. f—Including Norway, Sweden, Denmark and Finland. g—United Kingdom and French exports to Spain except in years prior to 1925. h—French imports have been reduced 12 per cent in order to eliminate imports of gutta percha and to reduce to basis of net weight. *United States imports of guayule are not included in this compilation: such imports amounted to 4,305 tons in 1926; to 5,010 tons in 1927; to 3,076 in 1928; and to 208 tons in the first 5 months of 1929.

Domestic Production of Miscellaneous Rubber Goods

	Rubber Proofed Fabrics Yards	Rubber Heels Pairs	Rubber Soles Pairs	Mechanical Goods Shipments Dollars
1924	25,020,000	186,279,000	(1)	$48,615,000
1925	23,988,000	206,970,000	16,211,620 (2)	64,877,000
1926	29,328,000	183,312,000	12,253,000	76,789,000
1927	37,872,000	201,014,000	27,160,000	68,625,000
1928	41,179,000	235,170,000	37,645,000	69,114,000
1928:				
January	2,177,000	17,682,000	3,431,000	$5,630,000
February	2,575,000	19,181,000	3,628,000	5,838,000
March	2,853,000	22,583,000	3,747,000	6,675,000
April	2,416,000	18,575,000	2,928,000	5,406,000
May	2,744,000	21,597,000	3,519,000	6,274,000
June	2,953,000	18,763,000	3,321,000	6,126,000
July	3,447,000	17,620,000	3,168,000	5,157,000
August	4,613,000	21,289,000	3,461,000	6,306,000
September	4,966,000	21,451,000	2,725,000	5,393,000
October	5,914,000	21,932,000	2,297,000	5,837,000
November	4,173,000	18,686,000	2,649,000	5,201,000
December	2,348,000	15,811,000	2,771,000	5,271,000
1929:				
January	2,828,000	19,975,000	3,876,000	6,033,000
February	3,095,000	18,979,000	2,869,000	6,135,000
March	4,123,000	17,226,000	2,746,000	7,013,000
April		17,256,000	2,601,000	

(1) Not available; (2) Last 9 months only.
Source: "Survey of Current of Business of the Department of Commerce."

United States Imports of Guayule Rubber and Related Gums

(All quantities in Long Tons)

	Guayule		Balata		Jelutong		Gutta Percha	
	Tons	Dollars	Tons	Dollars	Tons	Dollars	Tons	Dollars
1919	1,430	760,690	727	937,038	8,332	2,213,964	2,900	1,068,698
1920	758	345,985	1,064	1,260,043	5,672	2,068,501	3,183	1,520,309
1921	58	26,945	814	1,077,859	1,745	851,893	985	333,564
1922	127	57,040	812	978,765	2,335	403,812	818	281,012
1923	1,155	542,227	700	898,524	4,565	853,308	912	375,167
1924	1,856	536,392	464	568,456	6,165	1,237,100	1,408	463,610
1925	3,781	1,803,448	517	574,750	6,749	1,642,531	1,603	629,284
1926	4,305	2,562,096	354	327,213	7,263	3,127,757	1,445	661,156
1927	5,018	2,674,957	582	447,246	7,785	2,448,657	1,494	728,172
1928:	3,075	1,755,685	731	430,855	7,552	2,540,059	1,597	777,128
Jan.	432	242,339	27	24,218	588	183,705	150	86,702
Feb.	489	281,295	33	32,165	403	142,621	312	215,085
Mar.	575	365,927	32	26,460	829	388,616	115	57,833
Apr.	512	312,131	47	32,924	592	174,970	68	27,627
May	452	233,414	—	——	679	226,064	100	42,762
June	424	220,081	9	6,799	293	91,152	28	12,374
July	191	100,342	123	46,747	373	113,295	81	27,344
Aug.	—	——	399	165,460	451	126,962	147	60,738
Sept.	—	——	60	38,198	2,028	713,736	125	56,768
Oct.	—	——	121	59,358	429	129,065	239	94,570
Nov.	—	——	59	41,119	472	140,116	88	35,409
Dec.	—	——	83	58,311	522	156,154	145	59,911
1929:								
Jan.	—	——	46	30,374	484	152,260	138	62,950
Feb.	—	——	82	70,209	823	255,594	40	19,806
Mar.	—	——	90	75,444	428	122,026	1	1,140
Apr.	83	38,241	163	93,240	1,086	315,621	1	1,086
May	125	57,260	70	67,891	752	212,400	76	24,053
June	145	62,808	31	26,038	802	248,143	77	25,612

Reclaimed Rubber in the United States

(All Quantities in Long Tons—100% Basis)

Year	Production	Consumption Tons	Consumption % to Crude	Stocks*	Year	Production	Consumption Tons	Consumption % to Crude	Stocks*
1919	81,866	73,535	36.3	.....	1924	80,079	76,072	22.4	.....
1920	86,395	75,297	38.4	.....	1925	132,930	137,105	35.6	13,203
1921	36,725	41,351	24.1	.....	1926	180,582	164,500	45.9	23,218
1922	57,884	54,458	19.3	.....	1927	189,144	178,471	47.6	24,980
1923	74,766	69,534	22.7	.....	1928	208,516	223,000	50.4	24,785
1927:									
Jan.	16,526	12,374	39.3	25,903	July	15,488	13,842	47.4	26,599
Feb.	15,860	14,424	47.8	27,291	Aug.	15,109	15,836	47.3	25,157
Mar.	16,788	13,528	37.4	27,124	Sept.	14,392	14,790	54.3	23,429
Apr.	14,483	16,677	46.5	25,712	Oct.	16,127	17,292	64.5	22,176
May	16,159	15,754	46.1	26,419	Nov.	15,477	14,876	55.5	21,728
June	16,652	15,547	46.0	25,811	Dec.	16,083	13,431	52.7	24,980
1928:									
Jan.	14,862	20,140	58.5	21,941	July	17,278	19,070	51.0	17,305
Feb.	15,291	18,670	55.4	20,848	Aug.	19,049	17,890	41.7	15,881
Mar.	17,069	20,680	57.9	19,558	Sept.	18,693	17,795	44.6	17,991
Apr.	15,393	19,280	58.8	19,283	Oct.	17,182	18,420	45.1	17,026
May	18,945	20,215	54.1	18,137	Nov.	18,245	18,380	49.1	22,399
June	18,781	18,140	48.2	18,709	Dec.	17,728	14,320	45.9	24,785
1929:									
Jan.	18,685	21,068	49.1	24,394	July				
Feb.	18,094	19,829	47.7	23,305	Aug.				
Mar.	19,984	20,867	46.7	22,076	Sept.				
Apr.	19,899	22,435	47.3	20,680	Oct.				
May	20,385	23,176	47.1	19,479	Nov.				
June	18,416	18,141	42.0	17,980	Dec.				

*Stocks on hand at the end of month or year. Exports of reclaimed rubber, not shown in this table, amounted to 8,540 tons in 1927 and 9,577 tons in 1928.

INDEX TO ADVERTISERS

Adamson Machine Co. 473, 511
Akron Equipment Co. 471, 511
Albert & Son, L. 505, 511
Aluminum Flake Co. 507, 509
American Cyanamid Co. 436, 510
Anaconda Zinc Oxide Dept. of I. L. R. Co. 510
Anderson-Prichard Oil Corp. 510

Barrett Co., The 496, 510
Binney & Smith Co. 503, 510
Bridgwater Machine Co. 461, 511

Cabot, Inc., Godfrey L. ..... Back Cover, 509
Carrier Engineering Corp. 505, 511
Carter Bell Manufacturing Co., The 505, 510
Chalfin, Inc., Joseph 502, 512
Cleveland Liner & Mfg. Co. 512, 519
Continental Rubber Co. 507, 512
Cooper, Wm., & Nephews 509

Damascus Manufacturing Corp. 505, 510
Dill Manufacturing Co. 512
Dovan Chemical Corp. 509
du Pont de Nemours & Co., E. I. 509

Emerson Apparatus Co. 511
Erie Foundry Co. 511

Foote Bros. Gear & Machine Co. 473, 511
Farrel-Birmingham Co., Inc. 466, 511
Franz Foundry & Machine Co. 511

General Atlas Chemical Co. 510
General Tire & Rubber Co. 512
Gross, A., & Co. 510

Hall Co., The C. P. 463, 510
Huber, J. M., Inc. 465, 510

India Machine & Rubber Mold Co. 511
International Pulp Co. 502, 509

Lowe Co., The Clyde E. 511

Maywald, Fredk. J. 512
McNulty, Joseph A. 510
Montgomery, W. L. & Co. 510
Moore & Munger 467, 510
Muehlstein & Co., Inc., H. 507, 512

National Aniline & Chemical Co. 494, 509
National-Erie Co. 511
National Rubber Machinery Co. 511
Naugatuck Chemical Co. 476, 509
New Jersey Zinc Co. 464, 510

Olin Laboratories, The R. R. 512

Pequanoc Rubber Co. 470, 512
Philadelphia Rubber Co. 504, 512

Rand Rubber Co. 505, 512
Rare Metal Products Co. 509
Roessler & Hasslacher Chemical Co. 509
Royle & Sons, John 468, 511
Rubber Regenerating Co. 462, 512
Rubber Service Laboratories Co., The 509

Schrader's Sons, Inc., A. 469, 512
Scott Co., Henry L. 505, 511
Smith and Smith 512
Southwark Mfg. Co. 510
Spadone Machine Co. 511
Stamford Rubber Supply Co. 507, 510
St. Louis Sulphur and Chemical Co. 494, 510

Tasco Asphalt Co. 496, 510
Textile Finishing Machine Co., The 496, 511
Thomas, V. G., & Co. 509

United Clay Mines Corp. 507, 509
U. S. Rubber Co. 472, 512
U. S. Rubber Reclaiming Co. 475, 509

Vanderbilt, R. T., & Co. ..... Front Cover, 509

Weber, Hermann 512
West, H. T., Company 496, 510
Whittaker Clark & Daniels, Inc. 509
Williams, C. K., & Co. 505, 510
Williams Foundry & Machine Co., The 511
Wilson Co., C. T. 512
Wishnick-Tumpeer, Inc. 509

CLASSIFIED ADVERTISING—PAGE 504

Institution of the Rubber Industry

The various papers dealing with the scientific and technical aspect of rubber manufacture, together with the discussions thereon, read before the Institution of the Rubber Industry, London, England, appear exclusively in the Institution's official journal—the

"I. R. I. TRANSACTIONS"

The Journal is published six times a year, each issue containing approximately 100 pages of papers of vital interest to all interested in the manufacture and cultivation of Rubber, Gutta Percha and Balata.

Price 4s. 6d. per copy, post free.
£1.7.0. for 6 copies, post free.

Apply for Specimen Copy to W. F. V. Cox
Institution of the Rubber Industry
Faraday House, 10, Charing Cross Road
LONDON, ENGLAND

In the lead for more than 40 Years

GUMMI-ZEITUNG

Trade Journal for the
RUBBER, GUTTA PERCHA, ASBESTOS,
CELLULOID and Allied Industries

Central Organ for the
Whole German Rubber Goods Industry

Published Every Friday

SUBSCRIPTION RATES

In United States	RM 32
Domestic	RM 24

Sample copy free

WORLD WIDE CIRCULATION

Main Office of GUMMI-ZEITUNG
Berlin SW 19, Krausenstrasse 35/36

Best Advertising Results for all those desiring to make trade connections in Germany in this field.

THE RUBBER AGE

(of London)

THE MONTHLY PUBLICATION
for
ALL BRANCHES OF THE RUBBER INDUSTRY

Circulates Among Raw Rubber Producers,
Importers, Manufacturers
and Dealers

Published on
1st of each month

Subscription 10/- per annum
Single copies 1/3d post free

OFFICES:—43 ESSEX STREET, STRAND, LONDON, W.C.2.